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ABSTRACT

This study was conducted to develop a list of basic consumable and refundable supplies to be used in a secondary agricultural production mechanics laboratory program in Pennsylvania. A total of 72 surveys were sent to selected teachers: 24 in the area of woodworking, 24 in the area of metal working, and 24 covering all other areas of agricultural mechanics laboratory consumable supplies. The instrument was designed so that teachers could provide information about their department, community, units of instruction, teaching background, and amount of consumable supplies used. A total of 41 usable replies were used in data collection. Both tables and verbal analyses were prepared listing the variables, number of responses, mean responses, the standard error, and the ranges. A basic list of consumable and refundable supplies was developed. An extensive description of nonsupply variables was compiled, describing the community, department, and teachers of programs in the study. However, few generalizable conclusions could be formed from this data. It was recommended that lists be developed for other areas of agricultural production mechanics and that the lists be updated as technology changes. (Author/KC)

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ABSTRACT

The purpose of this study was to develop a list of basic consumable and refundable supplies for an agricultural production mechanics laboratory. Emphasis was placed on teacher background, department resources, units of instruction, jobs available in the community, and laboratory projects used.

The study was designed as a descriptive survey with the scope limited to production agriculture programs in Pennsylvania. The population was 72 vocational agriculture teachers selected from the Pennsylvania vocational agriculture teacher directory. Each selected agriculture department was sent a survey instrument to be completed by the selected teacher. One-third (24) of the teachers received a woodworking survey, one-third (24) received a metal working survey, and one-third (24) received a survey concerning all other areas of agricultural mechanics laboratory consumable supplies. The instrument was designed so that respondents could provide information about their department, community and the amount of consumable supplies needed.

A total of 47 (65%) of the teachers responded; however, due to missing data or incomplete returns, 41 (57%) of the questionnaires were used in the analysis.

Both tables and verbal analyses were prepared listing the variables, number of responses, mean responses, the standard error and the ranges. In addition to developing a basic list of consumable and refundable supplies, an extensive description of nonsupply variables is presented. These nonsupply variables describe the community, department and teachers of programs in the study.

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CHAPTER I

INTRODUCTION

Need for the Study

Many beginning agriculture teachers, as well as experienced teachers who have been faced with changing courses of study to meet the changing employment needs of the community, have requested assistance in identifying the consumable and refundable supplies needed for the agricultural mechanics industry.

An important consideration in determining the basic list of consumable and refundable supplies for agricultural mechanics has been the variation in production agriculture programs between schools. Other factors which influenced the types of refundable and consumable supplies needed include the amount and type of equipment available in each school, the number of students in each program and local community needs. These factors also affected the quantities of supplies needed. Schinstock (1978) discussed the considerations which a teacher should use to individually determine supplies needed. Schinstock's items are listed later in Chapter II.

Because there has been so much variation, so many considerations, and difficulty in prioritizing, decisions regarding budgeting for supplies may be improved if some general guidelines were available. This paper attempted to identify some basic consumable supplies for production agriculture programs in Pennsylvania. By combining this information with Schinstock's (1978) ideas on how to individualize supply lists, one may more adequately develop a list of supplies for the agricultural mechanics laboratory.

Additionally, in 1980, there was a 12.5 percent turnover of vocational agriculture teaching personnel in the United States. This represented the highest turnover in 16 years (Craig, 1981). Changes in teaching personnel have created a new environment for the local agricultural program and specifically a new environment for a large number of new or beginning teachers. This has resulted in additional problems for the continuity of an agriculture mechanics laboratory program as well as problems resulting from beginning teachers having less experience than the previous instructor. Craig (1981) found in 1980 the number of new teachers certified was the lowest in the previous 11 years; and of those certified, only 52 percent accepted teaching positions, the lowest percentage accepting positions during the previous nine years. Of the 1,561 beginning vocational agriculture teachers in 1980, 454 were given emergency or temporary certificates. Twenty-nine percent of the persons starting as teachers of agriculture in 1980 were not graduates of an approved agricultural education baccalaureate program (Craig, 1981).

The data from this study showed many vocational agriculture program dollars are staying the same or declining. Even where dollar amounts have increased, teachers have commented that it is because of significant changes in curricula requiring new or more supplies or inflation. The major problem with budget dollars has been buying power. Regardless of increase, decrease, or frozen budget dollars, vocational agriculture program dollars simply do not buy the same amount of goods as they once did.

Additional teacher comments indicated that economic pressures placed on suppliers have caused them to eliminate or restrict discounts

for school supplies and sell products at top market prices. In part due to high prices and budget cuts, vocational agriculture teachers have encountered the problem of making limited funds provide for the necessary supplies in a production agriculture program. One of the most critical elements in "stretching" limited funds has been to identify the essential supplies needed for the agricultural mechanics laboratory.

Agricultural education has been a dynamic educational discipline with vocational agriculture curricula constantly changing to reflect changing local community needs. Local agricultural economic sectors have changed from a strictly production sector to both production and service sectors. U.S. News and World Report, May 30, 1983, indicated that "Every farm worker creates jobs for 5.2 other workers." Phipps (1980) identified nine other agricultural occupational areas in addition to production agriculture that comprise all occupations in the total agricultural economic sector. The nine areas included: agricultural supply and service business, agricultural mechanics business, agricultural products business, ornamental horticulture, agricultural resources, forestry, agricultural technology, agricultural related technology, and other agriculture. Because our economic sectors have changed, agricultural production curricula have changed, requiring revision of agricultural programs too.

Objectives of the Study

The main objective of this study was to identify a list of basic consumable and refundable supplies for an agricultural production program mechanics laboratory. Additionally, the decisions for what and how many items were listed was compared to vocational agricultural program characteristics and teacher background characteristics.

The specific objectives were:

1. Determine the size of the current vocational agriculture program budget for consumable and refundable supplies in Pennsylvania production agriculture mechanics programs.
2. Determine a basic list of consumable and refundable supplies currently used in local vocational agriculture production program mechanics laboratories.
3. Determine how the basic list of consumable and refundable supplies is influenced by various teacher and department characteristics including:
   a. the professional and biographical background of the surveyed teacher and length of time at present teaching assignment;
   b. the size of vocational agriculture departments in terms of numbers of teachers and numbers of students;
   c. the emphasis placed on agricultural mechanics in the agricultural production program;
   d. the most common agricultural mechanics units taught in agricultural production programs;
   e. the most common types of jobs in the community;
   f. the census classification of the community.
4. Determine the most common required and student selected projects used by teachers in the agricultural production departments.

Operational Definitions

The following terms are defined as they apply to this study.

Consumable Supplies. Those supplies used in instructional development of specific abilities. Usually furnished by the school at no charge to the student. Quantities are depleted and must be resupplied (i.e., nails, saw blades, glue, sandpaper). (Bear and Hoerner, 1978)

Refundable Supplies. Those items used and paid for by students on approved individual projects. These items are stocked to eliminate delays in obtaining them when needed. Having these supplies on hand will keep the learning/work operating smoothly (i.e., lumber, plywood, metal, large bolts, hinges). (Morford, 1956)

Production Agriculture. All programs in Pennsylvania using a VEMIS code of 400 and including agricultural mechanics associated with occupations such as general livestock and crops farmer, dairy farmer, poultryman, custom worker, and hatchery worker. (PDE, Regulations, Standards Guidelines for Vocational Education, 1978)

Agricultural Mechanics. The common operations involving the selection, operation, maintenance, service, sales, and use of agriculture/agribusiness power units, machinery, equipment, structures and utilities. This is used in conjunction with the definition of Farm Mechanics, which is: The common operations involving mechanics on a farm and/or ranch. Included are: selection, operation and maintenance of farm power and machinery; farm structures, equipment and environment; farm electrification, power and controls; farm shop skills, construction and maintenance; soil and water management; and mechanical practices (USOE).

Limitations

1. The study was limited to Pennsylvania production agriculture programs included in the study.
2. The data was limited to agricultural mechanics consumable and refundable supplies used in the most common mechanics instructional areas for production agriculture programs.
3. The findings are useful to the extent that the teacher must make final decisions for purchasing consumable supplies considering factors identified by Schinstock (1978)(Appendix I).

Summary

Although each agriculture teacher may use the findings from this study for a different reason, it was clearly needed to assist both the beginning and experienced teacher in selecting and ordering consumable mechanics supplies. Unfortunately, not all objectives were accomplished since some data were only the opinion of the vocational agriculture teacher completing the survey. Most of the terminology used in this study should be familiar to the agriculture teachers of Pennsylvania. However, it was important to clarify the differences between consumable and refundable and the difference between agriculture mechanics programs and the agricultural mechanics subject areas taught in a production agriculture program.

The study was limited to Pennsylvania vocational agriculture teachers; however, when used in conjunction with the appendix relating to setting priorities and checking other local factors, the results become important to all vocational agriculture teachers. This study was intentionally

limited to production agriculture programs so the amount of data could be controlled. Other areas of agricultural mechanics consumable supplies studies may be pursued by future authors.

CHAPTER II

REVIEW OF LITERATURE

Criteria for Identifying Consumable and Refundable Supplies

The identification of consumable and refundable supplies has not been an extensively researched topic. Most of the agricultural mechanics laboratory information focused on the identification of tools, equipment, and shop layout designs. A search of the literature provided an equipment list from which to determine the consumable agricultural mechanics supplies generally needed in vocational agriculture programs.

Williams (1977) developed an alphabetical listing of tools and equipment needed for 25 different agricultural mechanics instructional programs. This list may be used to identify the consumable and refundable supplies needed for teaching such units (i.e., by seeing listed a portable belt sander, one may conclude that sanding belts are needed).

Several other authors (Phipps, 1972, 1980; Cook, 1973, 1941; Jones, 1954, 1955; Morford, 1956) discussed tools, equipment, storage, determining local program needs, shop arrangements and mechanics skills which should be taught to vocational agriculture students. Most of these references date 25 years or older. Roehl (1923) listed an appendix with suggested lists for sizes and amounts of nails (Appendix E). These outdated references served as adequate references, but they do not provide an accurate list of consumable supplies necessary to carry on the agricultural production program of today.

Cook (1941) addressed the need for planning supplies, and then listed amounts of rope, leather, drawing, woodworking, soldering and

blacksmithing materials needed for the program. Several of those units are no longer taught in today's agricultural production programs.

Phipps (1972, 1980) addressed how to organize, equip and arrange agricultural mechanics laboratories. He also discussed how to select tools, equipment and consumable supplies, but he never provided a list of consumables needed. In the book Mechanics in Agriculture Phipps listed tools but not consumables used with them (i.e., he listed saws needed but not saw blades). He also had several good chapters concerning consumables such as nails, screws, bolts, hinges, glue, rope and other hardware used in ag mechanics laboratories. There was another chapter for welding which discussed needs for gases, propane and rods.

Factors to Identify Types of Consumable Supplies Needed

According to Schinstock (1978), while it was impossible to list all the supplies needed for every program, the teacher could utilize such a list of supplies with consideration of the following factors: (1) number of students in the program, (2) space available, (3) amount of money budgeted, (4) objectives of program, and (5) needs and relationships of and with the agricultural community. Schinstock indicated that because budgets are limited, the problem was one of prioritizing. Since there was no definite answer to prioritizing, factors to be considered included: (1) contents of course of study (competencies and skills taught), (2) current amount of supplies on hand (requires annual inventory), (3) condition and age of supplies, (4) money and funds available, (5) number and type of tools on hand requiring consumables, and (6) tools and equipment ordered and supplies needed to make them useable. In some

cases it may be necessary to obtain donors or sponsors of specific supplies so money does not need to be budgeted or if funds for them are unavailable in the budget. That way the money may be used elsewhere or new items do become available when needed.

Once the program considerations were incorporated and some priorities established, Schinstock suggested other general factors need to be considered before purchases are made. These included: (1) prices compared between suppliers, (2) what is the quality of the product?, (3) reputation and firm establishment of manufacturer and supplier, (4) assurance of timely delivery, (5) adequate sizes and quantities available for your needs, (6) will product be delivered or picked up?...will that affect price?, (7) will the supplier replace damaged or broken items upon delivery?, (8) supplies should meet or exceed safety requirements, (9) secure and adequate storage is available, and (10) do students know how to properly use items to eliminate breakage and waste?

Bear and Hoerner (1978) suggested additional items to be considered: (1) what required projects will be constructed?, (2) what supplies will be available for students to use on approved projects which they supply some materials and purchase others?, (3) what and how much reserve of popular items is needed?, (4) what is needed for maintenance and repair of equipment, hand tools, and power tools?, and (5) what are actual and anticipated needs?

Previous Lists of Consumable Supplies

Schinstock (1978) listed tools and equipment needed (Appendix F) for an agricultural machinery service course, as well as providing a consumable

supplies list which corresponds to the agricultural machinery service course. There would be some overlap to agricultural production. He specifically designed his lists for classes of 15 students working in groups of four or five students.

Morford (1956) devoted a chapter to selecting and listing supplies needed for the agricultural mechanics laboratory in a workbook developed for students preparing to be agriculture teachers. He used terminology similar to all other references in chapters on supplies. He indicated that the selection of supplies is based on local needs, an inventory of what is on hand, and a distinction between consumable and "refunding" supplies. Morford did not, however, discuss the number of students, community needs, or type of units taught when he suggested quantities. Perhaps he found that since there are so many factors to be considered, a list of suggestions was sufficient. Also there were several outdated items contained in Appendix G.

Summary

Very few lists of consumable and refundable agricultural mechanics supplies exist. Some lists found were included in the appendices of this study. In order to make a basic list of these supplies generally needed by agricultural production departments, several references of tools and equipment must be searched to make intelligent decisions as to what consumables are needed for which tools. Also, agriculture teachers must distinguish between programmatic supplies which are those used to support units of instruction in agricultural mechanics and those consumable supplies used to support the function of tools. Teachers must determine their lists

of programmatic supplies based on the required mechanical projects and the most common student selected mechanical projects. Basically, the literature reviewed provides information concerning tool support consumable supplies and the teacher provides the information to determine programmatic supplies.

Schinstock and Bear and Horner provided some basic guidance to select priorities, determine program variables, and make general considerations before settling on a final list of consumable supplies.

All information reviewed considered these patterns:

1. Much of the material available on consumable supplies and refundable supplies was outdated.
2. More lists of tools and equipment were available than lists of supplies.
3. Limited information about supplies was available for agricultural production curricula, but no consideration was made as to how quantity was determined and whether the list was current.
4. Considerable information was available about how to plan and prioritize when budgeting for supplies.
5. A great deal of information about supplies can be gleaned by simply reading about how to perform the various mechanical skills and reviewing tool and equipment lists.
6. Consumable and refundable supplies have been defined by several authors but few attempt to list them.
7. Consumable supplies lists have primarily been developed by and for agricultural machinery service courses.

CHAPTER III

PROCEDURES

Design of the Study

The scope of this study was limited to selected agricultural production programs in Pennsylvania. Vocational agriculture programs and their respective teachers were purposely selected for participation in the study. This was a descriptive survey study where teachers were mailed a survey questionnaire to complete. Teachers were asked to respond to personal data questions and record the amounts of agricultural mechanics supplies on hand ordered each year, and what amounts of money are in their agricultural mechanics laboratory appropriations for the upcoming year. Each participant was asked to describe the community needs based on the agricultural census, the size of the department, and the units taught in the agricultural mechanics laboratory. When the survey instrument was returned, results were tabulated and analyzed to determine if patterns could be established.

Population and Sampling Procedure

From a current vocational agriculture directory (Pennsylvania), the agricultural production programs and respective teachers were noted, and 72 were purposely selected for participation in the survey. Each department was sent one survey instrument to be completed by a selected teacher. Teacher data were completed by the selected teacher. Community and department program information may have been completed collectively if the selected teacher was in a multiple teacher department. All 72

teachers were asked to provide demographic information. One-third of the teachers (24) received a woodworking survey, one-third (24) received a metal working survey, and one-third (24) received a survey concerning all other areas of agricultural mechanics.

Instrumentation

The survey instrument (Appendix B) was developed to make a complete as possible list of the basic consumable and refundable supplies being used by Pennsylvania agriculture teachers in agricultural production programs with agricultural mechanics laboratories. Because of the great diversity of supplies used in agricultural mechanics programs, it was determined that the survey would be conducted in three parts. One-third of the participants would receive one each of the three parts so that completion of the instrument would take a reasonable portion of the respondent's time.

The study began with an inventory of every agricultural mechanics tool, items of equipment, and all supplies used in the agricultural mechanics laboratory of the Waynesboro Area School District's vocational agriculture department. A review of literature was then conducted and any previously unlisted items were added to the survey list. The third step was to glean a list of supplies from commercial lists of equipment (i.e., table saws need blades, portable sanders need sanding belts, etc.).

After all potential supplies had been listed, they were categorized into the basic areas of instruction within agricultural mechanics. A first draft survey instrument was then constructed. Mr. Paul Benchoff, teacher of agriculture and now an agricultural mechanics teacher for over

30 years, was the only secondary level teacher to review the draft survey. The form was then reviewed by a panel of teacher education experts consisting of William Williams, Timothy Pierson and Edgar Yoder at The Pennsylvania State University.

Each of the three parts of the survey instrument were similar in length and in most cases asked teachers to "fill in the blanks" pertaining to their programs. Additional space was provided for optional, unusual or different answers. When several sizes or lengths of supplies were asked for, blanks were provided for the respondent to put in his unique information as well as checking off the standard information. Blanks were also provided to list required and student selected projects used in the individual school programs.

Data Collection

After the population sample for the study had been identified, the surveys were collated so that teachers received a cover letter, personal data questionnaire, and one of the three parts of the survey. Each copy of the survey instrument was code numbered and only coded numbers were recorded to maintain a record of receipt of returns. The cover letter described the study and provided instructions for how and when to complete the survey. A form copy of that letter is presented in Appendix A.

Self-addressed stamped envelopes were sent with each survey instrument to increase the motivation of the participant to return the instrument to the author. When the first mailing deadline date arrived, the return rate was 57 percent. A second letter, survey, and self-addressed stamped envelope were sent to those who had not responded to the first mailing. A

copy of that letter appears in Appendix C. As a result of that mailing, returns rose to 65 percent (Table 1). Fifty-seven percent of the questionnaires distributed were actually used in the data analysis, due to nonresponses or missing data.

Table 1. Categorical Returns of the Survey Instrument.

	Number	Percent
Woodworking	15	63
Metal working	13	55
Other	19	80
Total[a]	47	65

[a]Missing data resulted in 41 (57%) useable responses.

Statistical Analysis

All data were placed in the computer and the Statistical Analysis System (SAS) computer program was used to determine means and frequencies of the appropriate variables. After a general analysis of the basic list was made, tables listing the variables, number of responses per variable, mean response, standard error, and ranges were developed. Additionally, tables of analysis were developed for comparison using the variables of number of teachers in the department, number of years of teaching experience, number of students in the department, percent of the school district that is farm area, percent of the school district that is urban area, percent of the program that is agricultural mechanics, mechanics unit taught and agricultural occupations in the community.

In addition to the computer analysis, the survey yielded a list of catalogs used for ordering supplies and a list of required and student selected projects with the number of respondents and their percentile of positive response, which are listed in Appendix D and Tables 2 and 3. Also, in Chapters IV and V, the author addresses some of the points the computer cannot analyze. The validity of the information in the tables, appendices, and discussion of results is presented in later chapters in terms of how accurate a list this may be for individual programs.

Table 2. Required Agricultural Mechanics Projects.

	Project	Listings	
		Number	Percent
1.	Saw horse	21	29
2.	Feed scoop	14	19
3.	Tool box	13	18
4.	Welding	9	13
5.	Concrete and masonry/block laying	6	8
6.	Wiring board	5	7
7.	Utility building and red barns	5	7
8.	Awl/chisel/punch	3	4
9.	Shoe/boot scraper	3	4
10.	Plumbing/water circuit	3	4
11.	Cutting board	2	3
12.	Build rafters	2	3
13.	Tractor maintenance	2	3
14.	Mailbox	2	3
15.	Build floors	1	1
16.	Miter box	1	1
17.	Certificate frame	1	1
18.	Picnic table	1	1
19.	Pump lamp	1	1
20.	Tree planter	1	1
21.	Step stool	1	1
22.	Farm gates	1	1
23.	Bird house	1	1
24.	Workbench	1	1
25.	Window sash	1	1
26.	Card holder	1	1
27.	Foot stool	1	1
28.	Towel rack	1	1
29.	Strawberry box	1	1
30.	Car bumper	1	1
31.	Plaque/signs	1	1
32.	Door latch	1	1
33.	Dust pan	1	1
34.	Hitch/draw pin	1	1
35.	Welders chipping hammer	1	1
36.	Garden trowel	1	1
37.	Battery puller	1	1
38.	Jack stand	1	1
39.	Tool sharpening guage	1	1
40.	Restore/paint tractors	1	1
41.	Patio blocks	1	1

NOTE: Two schools (3%) have no required projects and no individual selected projects.

Table 3. Student Selected Agricultural Mechanics Projects.

	Project	Listings	
		Number	Percent
1.	Picnic table	12	17
2.	Machine painting and reconditioning	12	17
3.	Wagon/trailer/carts	9	13
4.	Gun racks/cabinets	9	13
5.	Jack stand	9	13
6.	Show box	8	11
7.	Sawhorse	7	10
8.	Feed scoop	7	10
9.	No selected projects	7	10
10.	Storage box/chest	6	8
11.	Cedar chest	6	8
12.	Bookshelves	6	8
13.	Small engine repair	6	8
14.	Tool box	5	7
15.	Calf hutches	5	7
16.	Car ramps	5	7
17.	Student supply own supplies	5	7
18.	Utility building and red barns	4	6
19.	Furniture	4	6
20.	Livestock equipment	4	6
21.	Hay racks	4	6
22.	Hog troughs/feeder	4	6
23.	Hitch/draw pins	4	6
24.	Firewood rack	3	4
25.	Welding	3	4
26.	Cutting board	2	2
27.	Tree planter	2	3
28.	Dog house	2	3
29.	Tape player boxes/speakers	2	3
30.	Truck bed	2	3
31.	Wagon bed	2	3
32.	Truck racks	2	3
33.	Signs/plaques	2	3
34.	Grain feeder	2	3
35.	Farm gates	2	3
36.	Welding stand	2	3
37.	Engine overhaul	2	3
38.	Wood surface refinishing	2	3
39.	Painting	2	3
40.	Workbench	2	3
41.	Lawn chairs	1	1
42.	Stool for bench	1	1
43.	Feed cart	1	1
44.	Log splitter	1	1
45.	Dry sink	1	1

Table 3. Continued.

Project	Listings	
	Number	Percent
46. Lamp	1	1
47. Hay wagon	1	1
48. Butcher table	1	1
49. Towel racks	1	1
50. Tool guage	1	1
51. Chisel/punches	1	1
52. Hay hook	1	1
53. C clamp	1	1

CHAPTER IV

FINDINGS

Objectives of the Study

The main objective of this study was to identify a list of basic consumable and refundable supplies for an agricultural production program mechanics laboratory. Additionally, the decisions for what and how many items were listed was compared to vocational agricultural program characteristics and teacher background characteristics.

The specific objectives were:

1. Determine the size of the current vocational agriculture program budget for consumable and refundable supplies in Pennsylvania production agriculture mechanics programs.
2. Determine a basic list of consumable and refundable supplies currently used in local vocational agriculture production program mechanics laboratories.
3. Determine how the basic list of consumable and refundable supplies is influenced by various teacher and department characteristics including:
   a. the professional and biographical background of the surveyed teacher and length of time at present teaching assignment;
   b. the size of vocational agriculture departments in terms of number of teachers and numbers of students;
   c. the emphasis placed on agricultural mechanics in the agricultural production program;

d. the most common agricultural mechanics units taught in agricultural production programs;

e. the most common types of jobs in the community;

f. the census classification of the community.

4. Determine the most common required and student selected projects used by teachers in the agricultural production departments.

Data presented in this chapter relate to the major study objectives. The data presented relate to three general areas: (1) the vocational agriculture teacher's background; (2) demographic data on the vocational agriculture department and operational practices therein; and (3) basic agricultural mechanics supplies for the vocational agriculture department.

The Teacher's Background

Information was collected to describe selected teacher background characteristics (Table 4). Overall, the teachers had completed approximately 3 years ($\bar{x}$ = 5.5 semesters) of high school vocational agriculture. Some teachers had no previous experience as a high school student of vocational agriculture, whereas others had completed four years of high school vocational agriculture.

Course Work in Agricultural Mechanics

The teacher's formal training in agricultural mechanics was assessed in terms of quarter hour credits of agricultural engineering courses completed through preservice and inservice education. As a group the teachers had completed approximately 13 quarter hour credits ($\bar{x}$ = 13.45) of agricultural engineering during their undergraduate program. There was a relatively large range (0-30 credits) in terms of the number of preservice

Table 4. Means and Standard Deviations for Teacher's Background Characteristics of Selected Variables by Those Teaching Wood, Metal and Other Areas.

Variable by Area Taught	n	$\bar{x}$	s.e.[a]
Semesters high school vocational agriculture			
wood area	12	4.66	1.18
metal area	10	6.80	.61
other areas	18	5.33	.91
combined	40	5.50	.56
Preservice credits in agricultural engineering[b]			
wood area	10	13.70	1.98
metal area	9	15.11	.94
other areas	18	12.50	1.68
combined	37	13.45	1.00
Inservice credits in agricultural mechanics[b]			
wood area	10	5.51	1.74
metal area	10	11.80	2.83
other areas	18	10.05	1.53
combined	38	9.97	1.12
Number of years in present position			
wood area	12	19.66	2.90
metal area	11	13.72	2.13
other areas	18	11.83	2.33
combined	41	14.63	1.51
Total years teaching vocational agriculture			
wood area	12	20.66	3.03
metal area	11	14.72	2.39
other areas	18	12.66	1.91
combined	41	15.56	1.44

[a] s.e. = standard error of means

[b] Reported as quarter hours of course credits

credits completed. Teachers had completed an average of 10 quarter hour credits ($\bar{x}$ = 9.97) of agricultural mechanics courses through inservice education. At the present time Penn State's Agricultural Education Department requires 9 credits in agricultural engineering for completion of the undergraduate degree. The number of inservice agricultural mechanics credits completed ranged from 0 to 30 credits. The inservice credits were not limited to agricultural engineering courses, but included all inservice courses that had an agricultural mechanics orientation. Many of the nonagricultural engineering courses are presented by the Agricultural Education faculty on such topics as hydraulics and teaching electric motors.

Area of Specialization

Teachers were asked to indicate their technical agriculture area of specialization for their undergraduate programs (Table 5). The data revealed that the majority of teachers (65.86%) had specialized in either animal science or agricultural engineering. Of the 41 teachers, 14 (34.15%) had specialized in agricultural engineering and 13 (31.71%) had specialized in animal science.

Table 5. Teacher's Area of Specialization in Undergraduate Programs by Those Teaching Wood, Metal and Other Areas (n = 41).

Area of Specialization	Area Taught							
	Wood		Metal		Other		Total	
	No.	%	No.	%	No.	%	No.	%
Animal Science	4	30.76	4	30.76	5	38.48	13	31.71
Plant Science	2	16.66	1	9.09	2	11.11	5	12.20
Agricultural Engineering	5	41.66	3	27.27	6	33.33	14	34.15
Agricultural Economics	0	0	0	0	1	5.55	1	2.44
Other	1	8.33	3	27.27	4	22.22	8	19.50

Teaching Experience

Vocational agriculture teaching experience was measured in terms of experience at the current school and total vocational agriculture teaching experience. Teachers had been employed in their current vocational agriculture teaching position approximately 15 years ($\bar{x}$ = 14.63). Number of years in the current position ranged from a low of one year to a high of 32 years. The total years of vocational agriculture teaching experience ranged from a low of two years to a high of 32 years. Teachers had taught vocational agriculture an average of 16 years ($\bar{x}$ = 15.56) (see Table 4).

Vocational Agriculture Department Characteristics

This section presents information pertaining to selected characteristics of the vocational agriculture programs.

Number of Teachers and Students in Vocational Agriculture

For the responding agriculture teachers, the data revealed that there were two teachers per department ($\bar{x}$ = 1.90). Also, just slightly less than the number of teachers per department was the number of teachers that taught some phase(s) of agricultural mechanics ($\bar{x}$ = 1.82). Literally every teacher had some agricultural mechanics teaching responsibilities (Table 6).

Table 6. Means and Standard Deviations of the Numbers of Teachers in Vocational Agriculture Departments and Responsibility for Teaching Agricultural Mechanics (n = 41 departments).[a]

Category	Mean	Standard Deviation	Minimum Value	Maximum Value
Number of teachers in the department				
wood	2.17	.27	1.00	4.00
metal	1.54	.24	0	3.00
other areas	1.94	.24	0	3.00
combined	1.90	.15	0	4.00
Number of teachers with agricultural mechanics responsibility				
wood	1.91	.31	0	4.00
metal	1.45	.15	1.00	2.00
other areas	2.00	.24	1.00	5.00
combined	1.82	.14	0	5.00

[a]Maximum and minimum values do not represent averages of the three groups but represent the lowest and highest values found in all three groups combined.

There were an average of 90 students ($\bar{x}$ = 89.36) per department, of whom 70 ($\bar{x}$ = 69.60) received agricultural mechanics instruction. Approximately 20 students (22%) took no agricultural mechanics instruction in their agricultural production programs. This may be due to the diversified nature of vocational agriculture courses of study in which other areas of instruction are offered to those not pursuing agricultural mechanics interests (Table 7).

Table 7. Means and Standard Deviations for Students Enrolled in Vocational Agriculture and Agricultural Mechanics.[a]

Category	Mean	Standard Deviation	Minimum Value	Maximum Value
Total number of students in vocational agriculture	89.36	8.46	21.00	330.00
Total number of students receiving instruction in agricultural mechanics	69.60	11.50	0	280.00

[a]Maximum and minimum values do not represent averages of the three groups but represent the lowest and highest values found in all three groups combined.

Percentage of Agricultural Mechanics Included in the Production Agriculture Program

There was an interesting comparison between area of specialization in college studies and just how much emphasis is placed upon agricultural mechanics subject matter in the local course of study. Thirty-four percent of the teachers specialized in agricultural mechanics, yet the average department devotes one-half ($\bar{x}$ = 49.12%) of the instructional time teaching agricultural mechanics. This means that 66 percent of our teachers specialized as an undergraduate in another area of which all other areas combined only make up about half of the total program. These data indicate that the undergraduate program is disproportional to the program currently presented in schools. The range in the percentage of the program devoted to agricultural mechanics was also startling. The lowest percentage of time devoted to agricultural mechanics was five percent and the maximum was 80 percent. Perhaps both extremes were simply a reflection of community needs or teacher capabilities (Table 8).

Table 8. Percentage of Agricultural Mechanics Included in the Production Agriculture Program.[a]

Group	n	Average Percentage	s.e.	Minimum Value	Maximum Value
Wood	12	48.16	5.20	10.00	80.00
Metal	11	46.36	4.47	5.00	65.00
Other	18	51.44	3.28	11.00	80.00
Total	41	49.12	2.37	5.00	80.00

[a]Maximum and minimum values do not represent averages of the three groups but represent the lowest and highest values found in all three groups combined.

Units in Agricultural Mechanics Taught

Subject units taught are an important factor in determining supplies needed. The information revealed (Table 9) that the four most frequent units taught were arc welding, oxy-acetylene welding, gas engines, and basic shop and tool safety. Teachers also added several units, of which the most common were concrete and masonry and painting.

Table 9. Frequency of Agricultural Mechanics Units Taught in Local Vocational Agriculture Departments.[a]

	Unit	Number	Percent
1.	Arc welding	41	100
2.	Oxy-acetylene welding	41	100
3.	Gas engines	40	98
4.	Shop and tool safety	40	98
5.	Woodworking	39	95
6.	Electricity	39	95
7.	Power tool operation	39	95
8.	Metal working	38	93
9.	Hand tool identification and use	35	86
10.	Farm machinery	32	78
11.	Farm power	29	71
12.	Electric motors and electrical controls	28	69
13.	Agricultural buildings and fences	28	69
14.	Plumbing	26	64
15.	Forge	17	42
16.	Diesel engines	16	40
17.	Hydraulics	13	32
18.	Concrete and masonry[b]	6	14
19.	Painting[b]	5	12
20.	Building construction[b]	1	2
21.	Ropework[b]	1	2
22.	Forestry mechanics[b]	1	2
23.	Glazing[b]	1	2
24.	Refrigeration[b]	1	2

[a]Based on responses from 41 vocational agriculture departments.

[b]Units which were not on the original list but were added by various teachers.

Inventory Practices

All departments surveyed indicated that they did perform an inventory. Although the intervals varied, 74 percent conducted an annual inventory (Table 10).

Table 10. Inventory Practices Used in Local Vocational Agriculture Departments (n = 41 departments).[a]

Inventory Practice Used	Number	Percent
No inventory used	0	0
Biennial inventory	1	2
Monthly inventory	4	10
Semi-annual inventory	8	19
Annual inventory	30	74

[a]The number column totals 43 because two departments performed monthly and annual inventories.

Budgets for Consumable and Refundable Supplies

Very few respondents presented data concerning their 1976-81 budgets for agricultural mechanics supplies. However, data showed a 7.8 percent increase in funds budgeted from the average of the 1976-81 time frame until the 1981-82 school year. From 1981-82 to the current year, budgets increased 9.3 percent or approximately $230. Based on what we know about inflation during this time period, until 1982 those increases were equal to or less than the consumer price index. The $230 increase was probably not enough to maintain the quantity and/or the quality of supplies purchased in the 1981-82 school year (Table 11).

Table 11. Budgets for Consumable and Refundable Supplies (rounded to nearest dollar).[a]

Budget Year	n	$\bar{x}$	s.e.	Minimum Value	Maximum Value
1976-81	10	$2,416	$1,357	$500	$ 5,000
1981-82	38	3,101	347	0	10,000
1982-83	39	3,331	1,064	400	8,000

[a]Maximum and minimum values do not represent averages of the three groups but represent the lowest and highest values found in all three groups combined.

Community Setting for Vocational Agriculture Programs

Typical community settings where vocational agriculture programs exist were about 40 percent rural farm ($\bar{x}$ = 40.57%); 40 percent rural nonfarm ($\bar{x}$ = 42.23%); and 20 percent urban ($\bar{x}$ = 21.47%). Examination of information in Table 12 reveals a great range differential for various programs. It should be noted that these data reflect vocational agriculture teacher opinion, not U.S. census data or Pennsylvania Department of Agriculture statistics. Also the definitions of the three terms were left up to the vocational agriculture teacher to use a definition related to U.S. census definitions. These two notes bring the validity of the data into question; however, vocational agriculture programs are developed with a great deal of teacher opinion.

Table 12. Community Setting for Vocational Agriculture Programs.

Community Setting	n	Mean Percentage	s.e.	Minimum Value	Maximum Value
Rural farm	38	40.57	3.46	4.00	80.00
Rural nonfarm	39	42.23	3.52	10.00	95.00
Urban	38	21.47	3.13	0	90.00

[a]Maximum and minimum values do not represent averages of the three groups but represent the lowest and highest values found in all three groups combined.

Agricultural Areas of Employment Opportunity

Respondents were asked to indicate, in their opinion, the types of jobs available in the community for their graduates. The lower the numbered rank given by the respondent, the greater the number of jobs the teacher thought were available in the community (Table 13). Apparently, the "average" school district with vocational agriculture production departments had about 40 percent rural farmland, 40 percent nonfarm rural areas, and 20 percent urban area (see Table 12). In that "average" setting, full-time farms provided the greatest number of jobs and landscaping provided the least number of jobs. There was great difficulty in interpreting employment opportunity data because there were no "clear cut" employment patterns. The data apparently indicated that the vocational agriculture program must develop students for a wide variety of occupations in the community.

Catalogs Used for Ordering Supplies

Agriculture teachers were asked to list their sources for identification, pricing and ordering consumable supplies. Those sources are listed in Appendix D.

Table 13. Agricultural Areas Selected by Vocational Agriculture Teachers as Offering the Greatest Employment Opportunity for Vocational Agriculture Program Graduates.

Agricultural Area	Number[a]	Mean Rank[b]
1. Full-time farms	38	1.52
2. Nursery	6	2.00
3. Forestry	10	2.20
4. Ag resources	9	2.33
5. Floriculture	5	2.40
6. Building construction	13	2.46
7. Part-time farms	31	2.48
8. Greenhouses	10	2.50
9. Ag production related sales	30	2.50
10. Specialty farms (orchards, Christmas trees, vegetables, etc.)	14	2.50
11. Ag supplies	26	2.57
12. General mechanics shop	21	2.61
13. Farm machinery	27	2.74
14. Farmer markets	6	2.83
15. Landscaping	12	3.00

[a]Number indicates the number of respondents ranking a particular agricultural area as one of the top 5 areas where the most jobs are available in the local area.

[b]Mean rank indicates how a particular agricultural area was ranked by those selecting it to be in the top 5 areas where the most jobs are available in the local area. One is most available and 5 is least available.

Required and Selected Student Projects

Required and selected student projects probably influence greatly the supplies to order. The projects required by teachers are identified in Table 2. It may be noted that the top three projects listed in Table 2 are required by many programs because they teach basic skills. This does not represent a complete listing of all required projects. Respondents were asked to list only the most common projects used.

Students in many vocational agriculture programs were also able to select their own shop projects. No one project predominated in the student selections (Table 3), although some of the more frequently selected projects were: building picnic tables, machine painting and reconditioning and building carts, gun cabinets and jack stands.

Basic Supplies Lists

Data presented to this point related to describing the "average" teacher and the "average" department. The tables in Appendix H compile the basic list of consumable and refundable supplies. This being one of the main objectives provides the reference list to answer the questions raised in the objectives.

CHAPTER V

SUMMARY, DISCUSSION AND CONCLUSIONS

Purpose of the Study

The purpose of this study was to identify a list of basic consumable and refundable supplies for an agricultural production program mechanics laboratory. Additionally, an effort was made to describe teacher and program characteristics. Those variables were: department size, school setting, amount of dollars budgeted for consumable and refundable supplies, number of teachers in the department, number of years of teaching experience, percent of the program that is agricultural production, units of agricultural mechanics subjects taught, and employment available in the community. Each of these areas is addressed in relation to the findings later in this chapter.

Objectives of the Study

The main objective of this study was to identify a list of basic consumable and refundable supplies for an agricultural production program mechanics laboratory. Additionally, the decisions for what and how many items were listed were compared to vocational agriculture program characteristics and teacher background characteristics.

The specific objectives were:

1. Determine the size of the current vocational agriculture program budget for consumable and refundable supplies in Pennsylvania production agriculture mechanics programs.

2. Determine a basic list of consumable and refundable supplies currently used in local vocational agriculture production program mechanics laboratories.
3. Determine how the basic list of consumable and refundable supplies is influenced by various teacher and department characteristics including:
   a. the professional and biographical background of the surveyed teacher and length of time at present teaching assignment;
   b. The size of vocational agriculture departments in terms of numbers of teachers and numbers of students;
   c. the emphasis placed on agricultural mechanics in the agricultural production program;
   d. the most common agricultural mechanics units taught in agricultural production programs;
   e. the most common types of jobs in the community;
   f. the census classification of the community.
4. Determine the most common required and student selected projects used by teachers in the agricultural production departments.

Procedures

This was a descriptive survey study where teachers were mailed a survey questionnaire. The questionnaire obtained information pertaining to teacher characteristics, department characteristics, and consumable and refundable supplies purchased. Teachers were asked to respond to personal data questions and record the amounts of agricultural mechanics supplies needed each year and the amount of money budgeted for agricultural mechanics laboratory supplies. Each participant was asked to describe the

mechanics laboratory supplies. Each participant was asked to describe the community based on the agricultural census. The scope of the study was limited to selected Pennsylvania agricultural production programs. When the survey instrument was returned, results were tabulated and analyzed to determine patterns and quantities of supplies used.

Discussion

To this point the findings are a listing of data reported on returned survey instruments. There are an extremely large number of variables that are not easily understood. Also, there are many factors to be considered before merely accepting the data. Each teacher must utilize those factors as described by Schinstock (1978) earlier in Chapter II to determine individual program needs. Units of instruction, required project needs as well as budgets must be considered before ordering supplies. In an effort to provide a greater understanding of the raw data a condensed list of wood, metal and other supplies is presented with the author's interpretation and "rounded off" quantities listed (Appendix H). Also the next several paragraphs describe the influences of the variables on the quantity of supplies ordered. In some cases a "rule of thumb" was apparent; in others there was no significant pattern to aid the teacher in ordering supplies.

Number of Students in Agriculture Program

Most items increased in quantity proportionally to the number of students. However, some individual items were inconsistent to the proportion of students. This appeared to be due to individual teacher choice. The individual choice may have been due to program objectives,

required or selected projects or units taught, but appeared to have no bearing on the number of students. Parameters analyzed: 0-50, 51-80, 81-115, and over 115 students.

Percent of Farmland in School District

There were no proportional relationships noted here. It did appear that a great deal depends on the type of projects built. For example, the fact that more outdoor plywood is ordered in the over 51 percent farmland areas could indicate that the farm students make more outdoor projects, such as calf hutches. The fact that the under 10 percent farmland areas ordered more supplies associated with fine woodworking could indicate they do more wood finishing projects. Another factor to consider here is how many of these more urban areas are converting their agricultural production programs to agricultural mechanics? This could explain why some of their items ordered were just as high as the other percentages of farmland. Parameters analyzed: less than 10 percent, 11-30 percent, 31-50 percent, and over 50 percent.

Years Teaching Experience

There were many items of which there were no significant differences between the amounts of supplies ordered by teachers with differences in years of teaching experience. There was a strong pattern showing that teachers with nine or less years of teaching experience are ordering more supplies in most categories. Additionally they were ordering substantially more of the larger items such as plywood and rough lumber. There are two possible explanations for this pattern. One, the experienced teacher has a better idea of what he needs, and he/she usually needs less to get the

job done. The second observation might be that the longer a teacher stays in a department the larger a supply reserve he can build and thus orders less each year. Parameters analyzed: 0-9 years, 10-19 years, and over 19 years.

Budgets

Not enough respondents had budgets of $500 or less or over $5,000 to be able to determine any trends in these areas. In most cases there was a proportional difference in the amount of items ordered with the amount of dollars budgeted with the other three budget groupings. The larger the budget the more items ordered. There were some significant differences in the major items such as lumber, plywood, nails, screws, and other more expensive items. Again, these differences appeared to be proportional to the amount of dollars budgeted. Parameters analyzed: less than $500, $501-$1,000, $1,001-$2,500, $2,501-$5,000, and over $5,000.

Number of Teachers in Department

According to the total data found concerning number of teachers, there are 2 teachers per production agriculture department and in most cases they both have agricultural mechanics teaching assignments. The results of the study concerning numbers of teachers indicated there was in most cases a proportional difference between the number of teachers and the amount of items ordered. The more teachers, however, usually the more students which would account for the proportional relationship. However there were also many areas where the data for two teachers were very similar to the data for three or more teachers. This is largely due to the fact that when there are three or more teachers many times not all

of them will teach agricultural mechanics. Parameters analyzed: 1, 2, 3, and over 3 teachers.

Percentage of Agricultural Mechanics Included in the Production Agriculture Program

Again the pattern is proportional. The more agricultural mechanics taught the more supplies ordered. The items of sanding discs, saw blades, tacker staples, chalk line blocks, etc. are listed in similar quantities due to the fact that the number of pieces of equipment that use these supplies compared to student use is similar. However there are still some major items that depend on the projects built and program objectives, such as how much pine, poplar and oak is ordered. These items show no patterns based on percent of program that is agricultural mechanics. Parameters analyzed: 0-33 percent, 34-66 percent, and 67-100 percent.

All Units Taught vs Common Units Taught

There is no difference in most amounts of supplies ordered based on this categorical comparison. Units listed on the survey are the most common, so to take data from the ten most common shows no or minor differences. The units not taught by all respondents are units such as hydraulics, diesel engines and concrete and masonry, and those respondents teaching these units spent budget money ordering their unique supplies and ordered fewer amounts of lumber, metal, etc. Also the amount of consumable and refundable supplies needed for units such as electric motors is extremely low and therefore differences in amounts of supplies ordered based on units taught is minimal. Essentially, the units not taught by all departments do not require high volumes of supplies. Parameters analyzed: all units taught were variables V14-V31. The

ten most common units were arc welding, gas welding, woodworking, metal working, electricity, farm power, farm machinery, power tool operation, shop and tool safety, and hand tool identification and use.

Percent Urban

There appears to be no patterns comparing quantity of supplies ordered with percent of urbanization. Where one is high and another is low the item itself does not lend itself to explanation. Also, because the definition of urban was not established, data were inaccurate. Parameters analyzed: 0-10 percent, 11-30 percent, 31-60 percent, and over 60 percent.

Occupations in Community

The comparisons made with these variables were not conclusive. No lists or formulas for identifying quantities of consumable and refundable supplies were apparent. There are a combination of occupational areas that agricultural mechanics teachers must prepare students for in their communities. Therefore no data were available to specifically compare the four major areas of occupations as to how many supplies are ordered by those teachers. Parameters analyzed: the occupation variables were grouped as follows: agricultural production--full-time farms, specialty farms, part-time farms; horticulture--landscaping, greenhouses, nursery, floriculture; mechanics--farm machinery, general mechanics shops, building construction; and nonagricultural production--sales, forestry, agricultural resources, markets, feed/supplies.

Recommendations

Putting together a list of frequencies and means was relatively easy compared to the vocational agriculture teacher's task of identifying an actual list of supplies to order. Suggestions may be made, factors may be considered, but no concrete, textbook answer can be printed to tell the agricultural mechanics teacher just how many consumable and refundable supplies should be ordered. The previously listed data as well as the condensed recommendations which follow may only be used as guidelines. The final decisions will still depend on program variables, priorities, and finances.

In the interest of clarity and to provide a checklist to assist agriculture teachers, a guide is offered (Appendix I) based on recommendations by Schinstock (1978), Bear and Hoerner (1978), and the author.

Appendix H is a list of recommendations which reflect the data of the study as well as personal choices of the author based on the experience gained from this study. These suggestions would be for an "average" program with an "average" vocational agriculture teacher. There are 70 students taking agricultural mechanics, two agriculture teachers, the most common units are taught as defined in this study, one inventory is conducted per year, and there is a large variety of occupations available in the community. The community is basically 40 percent farm area, 40 percent rural nonfarm area, and 20 percent urban area. Additionally, there is $3,500 to spend on consumable supplies for those 70 students. No planned or selected projects are suggested; adjustments would have to be made if teachers make selections. It should also be noted that this would be the quantities of items to be on hand at the beginning of the

beginning of the year. Once initial orders are on hand, the teacher can order only those quantities of items needed to restore stock to the desired starting quantity or new items to be added to the program.

Recommendations for Further Study

Based on the information and experience gained from this study, it is recommended that:

1. In addition to agriculture production mechanics, lists may be made for other areas of agricultural mechanics education, particularly in the areas of horticultural mechanics, agricultural mechanics supplies, and forestry mechanics.
2. Additional studies may be undertaken in disciplines other than mechanics. Perhaps lists may be made in the areas of instructional materials, reference materials, agricultural supplies curriculum materials and supplies and microcomputer software listings and reviews.
3. This study should be conducted and improved upon periodically to see if differences have evolved. If so, teachers could receive updated information.
4. As new technology and/or new agriculture teaching methods evolve, efforts should be taken to insure that a suggested list of consumable and refundable supplies accompany the materials and resources describing the new mechanic technique or unit of instruction.

Summary

The following items are noted in conclusion:

1. This study updates all information on consumable supplies used in agricultural mechanics for agricultural production programs in Pennsylvania.
2. This is the only recommended list of consumable and refundable supplies for production agricultural mechanics programs at this time.
3. Appendix I is only a checklist to assist teachers with planning, prioritizing, and determining a list of supplies for their program.

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APPENDIX A

COVER LETTER INITIAL SURVEY INSTRUMENT

WAYNESBORO AREA SCHOOL DISTRICT
P.O. BOX 72 WAYNESBORO, PENNSYLVANIA 17268
(717) 762-1191

May 26, 1982

Dear Fellow Vo-Ag Teacher:

Our vocational agriculture courses of study are constantly changing to meet the needs of the community and rapidly growing technological industry. A problem we all face is keeping a constant source of supplies on hand to meet those demands.

With enrollments fluctuating, prices for products and services increasing and increased emphasis on justification and support of vocational programs, our budgets must reflect precise listings and accurate assessments of our educational supply needs. Many times we order a little of this and a little of that or just decide we ought to have a few more of these. Also we tend to order the same quantity and items that we did the previous year and take on a few dollars for inflation.

I am undertaking a study to determine the basic consumable and resalable supplies used in the ag mechanics laboratory of the ag production program. I am sending you the enclosed survey section in hopes that you will respond with as accurate data as possible. Other vo-ag teachers are providing information for other areas of agriculture mechanics. I realize the burdens of an ag teacher are many and great.

The largest portion of the survey may be completed by simply "filling in the blanks". Hopefully you will have copies of your inventory and budget information to assist you in this task. Also, please feel free to copy the survey if you feel it will help you with your inventory and budget requests in the future. If you would like a copy of the complete final listing of consumable and resalable supplies with suggested quantities, please check the appropriate box on the survey.

It is my hope that you will find time and interest to complete this survey and mail it to me in the self addressed stamped envelope enclosed by June 15, 1982. The results of the study will be published in my masters thesis, the department abstracts, and probably "PAE". If any checklists and rules of thumb are developed they will be available through the Ag Ed department. I hope that the wisdom of our state teachers can be put on paper to aid all who follow and all who change or continue their programs in the future.

Thank you for your time, effort, and cooperation. I look forward to hearing from you by June 15th.

Sincerely and professionally,

David L. Gerstenlauer
Teacher of Agriculture

APPENDIX B

THE SURVEY INSTRUMENT IN FOUR PARTS

Survey of
Agricultural Mechanics
Laboratory Supplies
Used by
Pennsylvania Production Agriculture Teachers

(used only to identify schools not responding)

I would like a copy of the compiled results of this survey (check one) ___ yes ___ no

Complete the blank spaces in the sections which follow:

I. STATUS OF TEACHER

_____ semesters of high school vo-ag completed as a student

_____ total years experience in ag mechanics occupation(s)

number of college credits completed in ag mechanics for

preservice _____ for inservice _____

_____ number of years at present position

_____ total years in teaching vo-ag

area of specialization in college for B.S. (check one)

_____ Animal Science

_____ Crop Science

_____ Ag Engineering

_____ Ag Economics

_____ Forestry/Natural Resources

II. RESOURCES DEVOTED TO AG MECHANICS IN SCHOOL PROGRAM

_____% of total vo-ag program that is ag production

_____% of total ag production program that is ag mechanics

_____ total number of teachers in vo-ag department

_____ number of teachers in department with responsibility for teaching ag mechanics

_____ total number of students in vo-ag department

_____ total number of students taking production ag mechanics

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Ag mechanics units taught (check all that apply, list others below)

_____ Arc welding	_____ Electricity	_____ Forge
_____ Gas welding	_____ Gas Engines	_____ Power tool operation
_____ Woodworking	_____ Diesel Engines	_____ Shop & Tool safety
_____ Metalworking	_____ Electric motors/ controls	_____ Hand Tool ID & Use
_____ Plumbing	_____ Farm Power	_____ Ag Building & Fences
_____ Hydraulics	_____ Farm machinery	_____ Other (list)

_____

_____

How often do you conduct a physical inventory of the ag mechanics lab supplies? (check all that apply)

_____ monthly _____ semi-annual _____ annual _____ biennial

_____ never _____ other (describe) _____

What major agricultural jobs are available in your community? (check all that apply, list others below). Indicate the 5 most available jobs where people are working now. 1 is the most, 5 the least.

_____ Full-time farms (dairy, livestock, crops)	_____ Part-time farm
_____ Specialty farms (orchards, X-mas tree, veg. crops, etc.)	_____ Greenhouses
_____ Landscaping business	_____ Ag resources related
_____ Ag production related sales	_____ Farmer's market
_____ Building construction	_____ Feed, seed, chemical businesses
_____ Forestry	_____ Nursery
_____ Farm machinery	_____ Floriculture
_____ General mechanics shops	

How do you classify your school district? Describe % in each area.

_____% farm _____% rural non-farm _____% urban

How much is your 1981-82 Ag mechanics consumable supplies budget?

(Total dollars) _____ How much did you average from 1976-1981 for consumable supplies budgets?

(Total dollars) _____ How much is your 1982-83 ag mechanics consumable supplies budget?

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III. REFERENCES USED TO SELECT TOOLS, EQUIPMENT AND SUPPLIES (check (✓) all that apply, list others below)

_____ Brodhead & Garrett _____ Graves & Humphrey _____ Satco

_____ Local catalogs (list) _____ Other national or state catalogs (list)

IV. LIST THE MAJOR PROJECTS WHICH YOU REQUIRE WHICH USE CONSUMABLE OR RESALABLE SUPPLIES.

Project	Unit Taught

V. LIST THE FIVE MOST COMMON STUDENT SELECTED PROJECTS BUILT IN YOUR LAB WHICH USE CONSUMABLE OR RESALABLE SUPPLIES.

LIST ALL AG MECHANICS CONSUMABLE AND RESALABLE SUPPLIES YOU WOULD ORDER EACH YEAR FOR YOUR PROGRAM (For each category, check all that apply, list others below, fill in any descriptions needed. If units, sizes or quantities do not match your choices, either convert to units listed or list your units in its place. Make any other written notations beside the appropriate item as necessary.)

WOODWORKING

_____board feet of oak

_____board feet of pine

_____board feet of poplar

_____board feet of cedar

_____board feet of other wood

_____linear feet of 2 X 6

_____linear feet of 2 X 4

_____linear feet of 2 X 12

_____linear feet of 2 X 10

_____sq ft of plywood indoor 1/8"

_____sq ft of hardboard or masonite

_____sq ft of plywood indoor 1/2"

_____sq ft of plywood indoor 1/4"

_____sq ft of plywood outdoor 1/4"

_____sq ft of plywood indoor 3/4"

_____sq ft of plywood outdoor 3/4"

_____sq ft of plywood outdoor 1/2"

_____sq ft of pegboard

_____sq ft of plywood _____

_____linear ft of dowel rod 1/4"

_____linear ft of dowel rod 1/8"

_____linear ft of dowel rod 1/2"

_____linear ft of dowel rod 3/8"

_____linear ft of dowel rod 3/4"

_____linear ft of dowel rod 5/8"

_____linear ft of dowel rod 1"

_____bundles asphalt shingles

_____bundles wood shingles

_____linear ft of roof flashing

_____each med sand disc diam. _____

_____each fine sandling disc diam. _____

_____each fine sand belt lgth _____

_____each coarse sand disc diam. _____

_____each coarse sand belt lgth _____

_____each med sanding belt lgth _____

_____each sand sleeve med 1" diam.

_____each sand sleeve fine 1" diam.

_____each sand sleeve fine 2" diam.

_____each sand sleeve coarse 1" diam.

_____each sand sleeve coarse 2" diam.

_____each sand sleeve medium 2" diam.

_____sheets medium sandpaper

_____sheets fine sandpaper

_____sheets coarse sandpaper

_____each 1/4" band saw blade

_____each 3/8" band saw blade

_____each 1/2" band saw blade

_____each ____" band saw blade

_____each jig saw blade

_____each sabre saw blades

_____each coping saw blade

_____each _____saw blades

_____each portable circular saw blade diameter _____

_____each stationary circular saw blade ripping diameter _____

_____each stationary circular saw blade cross cut diameter _____

_____each stationary circular saw blade combination diameter _____

_____each stationary circular saw blade planer diameter _____

_____yes _____no Do you use carbide tip blades? _____How Many?

_____number of cutting bits in set of router bits

_____number of edging bits in set of router bits

_____number of points in handrill point set

_____number of counter sinks size 8 and under

_____number of counter sinks size 9 and over

_____number of speed bores in set; if individual _____ 1/4 _____5/16

_____3/8 _____7/16 _____1/2 _____9/16 _____5/8 _____11/16 _____3/4

_____13/16 _____7/8 _____15/16 _____1 _____1 1/8 _____other _____

_____lbs of common nails size 8 and smaller

_____lbs of common nails size 9 and larger

_____lbs of finishing nails size 8 and smaller

_____lbs of finishing nails size 9 and larger

_____lbs of roofing nails length _____ _____lbs of roofing nails lgth. _____

_____boxes of wire nails assorted sizes weight _____

_____boxes of wire brads assorted sizes weight _____

_____boxes of corrugated fasteners assorted sizes

_____boxes heavy duty tacker staples 1/4" quantity _____

_____boxes heavy duty tacker staples 5/16" quantity _____

_____boxes heavy duty tacker staples 3/8" quantity _____

_____boxes heavy duty tacker staples 1/2" quantity _____

_____boxes heavy duty tacker staples size _____ quantity _____

_____number of flat head wood screws size 8 and smaller

_____number of flat head wood screws size 9 and larger

_____number of round head wood screws size 8 and smaller

_____number of round head wood screws size 9 and larger

_____number of square bent screw hooks

_____number of screw eyes

_____number of screw hooks

_____number type screw _____

_____number tape measure replacement blades

_____chalk block for marking chalk line

Other woodworking supplies-describe in detail:

LIST ALL AG MECHANICS CONSUMABLE AND RESALABLE SUPPLIES YOU WOULD ORDER EACH YEAR FOR YOUR PROGRAM (For each category, check all that apply, list others below, fill in any descriptions needed. If units, sizes or quantities do not match your choices, either convert to units listed or list your units in its place. Make any other written notations beside the appropriate item as necessary).

METALWORKING

_____forge gas (describe quantity) _____lbs forge coal

_____sheets_____sq in galvenized sheet metal_____guage

_____sheets_____sq in galvenized sheet metal_____guage

_____sheets_____sq in galvenized sheet metal_____guage

_____sheets_____sq in black sheet metal_____guage

_____sheets_____sq in black sheet metal_____guage

_____sheets_____sq in black sheet metal_____guage

_____sheets_____sq in aluminum_____guage

_____sheets_____sq in aluminum_____guage

_____feet round steel 3/8" diameter _____feet round steel 1/4" diameter

_____feet round steel 1/2" diameter _____feet round steel 5/16" diameter

_____feet round steel 7/16" diameter _____feet round steel 5/8" diameter

_____feet round steel 3/4" diameter _____feet round steel 1" diameter

_____feet round steel ____" diameter _____feet mild steel bars ____"X _____"

_____feet mild steel bars ____" X ____" _____feet mild steel bars ____" X ____"

_____feet mild steel bars ____" X ____" _____feet octagon tool steel 1/2" diam.

_____feet octagon tool steel 5/8" diam. _____feel octagon tool steel ___" diam.

_____feet angle iron___X___X___ _____feet angle iron ___X___X___

_____feet angle iron___X___X___ _____feet angle iron____X___X___

_____feet threaded rod 1/8" diam. _____feet threaded rod 1/4" diameter

_____feet threaded rod 3/8" diam. _____feet threaded rod 1/2" diameter

_____feet threaded rod 3/4" diam. _____feet threaded rod ____" diameter

_____number of griding wheels, fine _____number of med grit grinding wheels

_____number of coarse grit grind wheel _____number of fine grit wire brush wheel

_____number of med grit wire br wheel _____number of coarse grit wire brush wheel

_____number of cloth buffing wheels____type____number of cloth buff wheels____type

_____number of cloth buffing wheels____type____number of cloth buff wheels____type

METALWORKING-continued

_____number abrasive disc for metal sanding ____grit

_____number abrasive disc for metal sanding ____grit

_____number of hacksaw blades _____number of power hacksaw blades

_____number of power metal hacksaw blades 1/4" wide

_____number of power metal hacksaw blades 3/8" wide

_____number of power metal hacksaw blades 1/2" wide

_____number in drill bit set _____1/16____5/64____3/32____7/64____1/8____9/64

_____5/32____11/64____3/16____19/64____7/32____15/64____1/4____17/64____9/32

_____19/64____5/16____21/64____11/32____23/64____3/8____25/64____13/32____27/64

_____7/16____29/64____15/32____31/64____1/2____5/8____3/4____7/8____1____other

_____number____size list below:

_____pints cutting oil _____number soft iron rivets assorted sizes

_____Number alluminum rivets asst.ss. _____number tubular rivets assorted sizes

_____how many sizes soft iron rivets? _____how many sizes alluminum rivets?

_____how many sizes tubular rivets? _____number of pop rivets assorted sizes

_____how many sizes pop rivets? _____number of self tapping screws

_____how many sizes of tapping screws? _____number of flat head stove bolts

_____how many sizes of flt hd stove blt_____number of round head stove bolt

_____how many sizes of rd hd stove bolt_____number of carraige bolts

_____how many sizes of carraige bolts? _____number of cap screws

_____how many sizes of cap screws? _____number of machine bolts

_____how many sizes of machine bolts? _____number of cotter pins

_____how many sizes of cotter pins? _____number of wing nuts

_____how many dizes of wing nuts? _____number of lock washers

_____how many sizes of lock washers? _____number of flat washers

_____how many sizes of flat washers? _____number of nuts

_____how many sizes of nuts? _____rolls _____length crocus paper

_____sheets_____size crocus paper _____rolls _____length emery cloth

_____sheets_____size emery cloth _____lbs solder resin core in spools

METALWORKING-continued

_____lbs solder acid core in spools _____lbs of bar solder

_____(describe qty)_____number propane _____lbs solder flux_____type

_____lbs solder flux_____type Other metalworking supplies. Describe below:

LIST ALL AG MECHANICS CONSUMABLE AND RESALABLE SUPPLIES YOU WOULD ORDER EACH YEAR FOR YOUR PROGRAM (For each category, check all that apply, list others below, fill in any descriptions needed. If units, sizes or quantities do not match your choices either convert to units listed or list your units in its place; make any other written notations beside the appropriate item as necessary.)

ELECTICITY

_____number of light bulbs_____watts _____rolls_____yds insulation tape

_____rolls_____yds friction tape _____number of fuses_____amps

_____number of fuses_____amps _____number of solderless wire connectors

_____boxes_____qty/box insulated staples_____feet electrical cable_____size

_____feet electrical cable _____size _____feet electrical wire_____size

_____feet electrical wire_____size _____number of grounding clips or screws

Other electricity supplies. Describe below:

PLUMBING

_____number of plastic pipes _____(describe diameter) _____feet

_____number of plastic pipes _____(describe diameter) _____feet

_____number of metal pipes _____(describe diameter) _____feet

_____number of metal pipes _____(describe diameter) _____feet

_____feet rigid copper tubing _____(describe diameter)

_____feet flexible copper tubing _____(describe diameter)

_____number of flare fittings _____sizes

_____number of faucet washers _____sizes

Item	Metal	Plastic
tees	_____number _____sizes	_____number _____sizes
couplings	_____number_____sizes	_____number _____sizes
elbows	_____number _____sizes	_____number _____sizes
street elbows	_____number _____sizes	_____number _____sizes
unions	_____number _____sizes	_____number _____sizes
plugs	_____number _____sizes	_____number _____sizes

PLUMBING-continued

Item	Metal		Plastic	
reducing coupling	_____number	_____sizes	_____number	_____sizes
reducing elbows	_____number	_____sizes	_____number	_____sizes
sill cock	_____number	_____sizes	_____number	_____sizes

Other plumbing supplies. Describe below:

WELDING--ARC and OXY-ACETYLENE

_____cu ft oxygen _____cu ft acetelene

_____cu ft other gases _____ _____number of flint starters

_____number of clear goggle lenses _____number of colored goggle lenses, shade no.___

_____no. of colored goggle lenses s.no.___ _____pairs of asbestos gloves

_____lbs of electrodes mild steel _____lbs of electrodes non machineable cast

_____lbs of electrodes machineable cast _____lbs of electrodes hardsurfacing

_____lbs of electrodes alluminum _____lbs of electrodes carbon

_____lbs of cast iron flux _____lbs of brasing flux

_____lbs of alluminum flux _____lbs of steel welding rods

_____lbs of bronze welding rods _____lbs of cast welding rods

_____lbs of hardsurface rods _____lbs of alluminum rods

Other welding supplies. Describe below:

PAINTING-FINISHING-GLAZING

_____number of brushes _____size _____number of brushes _____size

_____number of brushes _____size _____number of stencil burshes

_____number of parts cleaning brushes _____sizes

_____gal paint indoor _____gal paint exterior

_____gal paint metal _____gal oil stain

_____gal varnish stain _____gal shellac

_____gal linseed oil _____gal lacquer

PAINTING-FINISHING-GLAZING-continued

_____gal natural wood preservative/sealer _____gal turpentine

_____gal mineral spirits _____gal lacquer thinner

_____gal shellac thinner _____gal paint remover _____type

_____gal paint remover _____type _____number of paint rollers _____size

_____pads of steel wool fine grain _____pads steel wool medium grain

_____pads of steel wool coarse grain _____lbs plastic wood natural

_____lbs plastic wood oak _____lbs plastic wood dark mahogany

_____lbs plastic wood walnut _____lbs plastic wood other_____

_____lbs plastic wood other_____ _____pints plastic wood solvent

_____lbs paste wax _____number of respirator replacement filters

_____lbs of glazing compound _____number of glazier points

_____gal liquid wood glue _____ounces epoxy

_____ounces contact cement _____lbs resin glue

Other painting, finishing, glazing supplies: Describe below:

MASONRY

_____number of corner blocks _____number of stretcher blocks

_____number of other type blocks _____number of bricks

_____lbs of gravel _____lbs of sand for concrete

_____lbs of sand for mortar _____lbs of lime

_____lbs of cement _____number of masonry drills in set

_____1/4"_____3/8"_____1/2"_____5/8"_____3/4"_____1"_____other size_____

Other masonry supplies. Describe below:

ROPEWORK

_____feet whipping cord _____feet manilla rope 3/8"

_____feet manilla rope 1/2" _____feet manilla rope size_____"

_____feet nylon rope size_____ _____feet nylon rope size_____"

ROPEWORK-continued

Other ropework supplies. Describe below:

MACHINERY & ENGINE REPAIR

_____lbs cup grease long fiber _____lbs cup grease short fiber.

_____qts motor oil 10W-30 _____gal gasoline

_____spark plugs _____gal antifreeze

_____number of assorted gaskets _____boxes baking soda

_____ounces radiator flush cleaner _____gal hydraulic fluid

_____lbs cup grease non fiber _____gal distilled water

_____lbs petroleum jelly _____ounces penetrating oil

_____ounces liquid wrench _____ounces WD 40

_____number of finishing stone grit _____ _____number of roughing stone grit_____

_____number of surfacing stone grit _____ _____lbs compund sweeping grease absorbant

Other machinery and engine repair supplies. Describe below:

SHOP CLEANING & MISCELLANEOUS SUPPLIES

_____lbs of steam cleaner detergent _____gal of steam cleaner detergent

_____number of vacuum cleaner bags _____number of large trash bags

_____lbs of all purpose detergent _____gal of all purpose detergent

_____ounces of scouring powder _____gal of parts cleaner fluid

_____gal of liquid soap for hands _____ounces of soap (or special hand cleaner)

_____lbs of pumice stone _____rolls_____yds masking tape_____width

_____rolls_____yds masking tape____width _____rolls_____yds scotch tape_____width

_____rolls_____yds scotch tape_____width _____number of push type brooms

_____number of winter top brushes _____lbs of cleaning rags

_____lbs of waste material for cleaning _____number of safety goggles/glasses

_____number of shop aprons/coats _____boxes_____qty/box standard staples

APPENDIX C

FOLLOW-UP LETTER SENT TO NONRESPONDENTS OF FIRST MAILING

WAYNESBORO AREA SCHOOL DISTRICT
P.O. BOX 72 WAYNESBORO, PENNSYLVANIA 17268
(717) 762-1191

June 23, 1982

Dear Vocational Agriculture Teacher:

Several weeks ago you received a letter and survey form requesting your assistance in a study concerning consumable and resaleable supplies for agriculture mechanics. As of today, I have not received your completed copy of the form. Enclosed is another survey form for you to complete. I would appreciate receiving the completed form by July 7.

We believe the results of this study will be helpful in identifying a basic list of consumable and resaleable supplies for our teachers. Thank you for your kind assistance.

Sincerely,

David L. Gerstenlauer
Vocational Agriculture Teacher

APPENDIX D

SOURCES TO IDENTIFY, PRICE AND ORDER CONSUMABLE SUPPLIES

Catalogs Used by Local Instructors to Identify, Price and Order Consumable Supplies and Refundable Items

Catalog	Number	Percent
Broadhead & Garrett	37	91
Graves & Humphrey	38	93
Satco	17	42
Paxton, Patterson	11	27
Sears	3	7
NASCO	2	5
Forestry Suppliers, Inc.	2	5
Napa	1	2
Stanley	1	2
Ind. Arts Supply Co.	1	2
Gables	2	5
Hanover Hardware	2	5
Snap On	2	5
Kurtz	1	2
Delaware Valley Safeguards Co.	1	2
Harvey Welding	1	2
J. W. Fogle	1	2
A. M. Leonard	1	2
Geiger	1	2
Ball	1	2
Fredericks	1	2
L. A. Benson	1	2
Harrisburg Hardware	1	2
Local Greenhouse Catalogs	1	2
Lebanon Hardware	1	2
Midwest	1	2

APPENDIX E

EXERPTS FROM ROEHL (1923) LISTING CONSUMABLE SUPPLIES

Number of Nails to the Pound

Size	Length	Number per Pound		
		Common	Finishing	Casing
2d	1 in.	860	1,558	1,140
3d com.	1 1/4 in.	594	884	675
4d	1 1/2 in.	339	767	567
5d	1 3/4 in.	230	491	396
6d	2 in.	205	359	260
7d	2 1/4 in.	135	317	239
8d	2 1/2 in.	96	214	160
9d	2 3/4 in.	92	195	148
10d	3 in.	63	134	108
12d	3 1/4 in.	52	120	99
16d	3 1/2 in.	58	91	69
20d	4 in.	30	61	70
30d	4 1/2 in.	23		45
40d	5 in.	17		35
50d	5 1/2 in.	13		
60d	6 in.	10		

Quantity of Nails per M Feet of Lumber

Sheathing, per M, 8d com., 20 lb.
Sheathing, per M, 10d com., 25 lb.
Flooring, per M, 8d com., 30 lb.
Flooring, per M, 10d com., 35 lb.
Studding, per M, 10d com., 14 lb.
Studding, per M, 20d com., 10 lb.
Furring, per M, 10d com., 10 lb.

Finish flooring, per M, 7/8 in., 8d fin., 20 lb.
Finishing, 7/8 in. per M, 8d fin., 30 lb.
Finishing, 1 1/8 in. per M, 10d fin., 40 lb.
Beveled siding, per M, 6d com., 18 lb.
Lath, per M, 3d com., 6 1/2 lb.
Shingles, per M, 4d com., 4 lb.

APPENDIX F

LIST OF CONSUMABLE SUPPLIES CORRESPONDING TO AN AGRICULTURAL MACHINERY SERVICE COURSE (Schinstock, 1978)

AGRICULTURAL MACHINERY SERVICE OPTION

CONSUMABLE SUPPLIES LIST

ITEM	DESCRIPTIONS EXAMPLES	QUANTITY
Abrasive Spark plug cleaner	1 lb. box	1
Acetylene	100 cu. ft. cylinder	4
Antifreeze	Ethylene glycol (permanent) type, gallons	4
Batteries	1.5 volt, Type D	12
	1.5 volt, Type C	6
	9 volt, rectangular	2
Blades, hand hacksaw	18 T.P.I., 12" X ½" X .025", high speed molybdenum	24
	24 T.P.I., 12" X ½" X .025", high speed molybdenum	12
Blades, metal cutting bandsaw	14 T.P.I., 10' - 10½" X 3/4" X .032"	10
Blades, power hacksaw	14 T.P.I., 12' X 1" X .050", high speed	12
Bolts, carriage	¼", assorted lengths, with nuts, NC threads, bolts of each length	5
	3/8", assorted lengths, with nuts, NC threads, bolts of each length	5
	½", assorted lengths, with nuts, NC threads, bolts of each length	5
Bolts, machine	¼", assorted lengths, with nuts, NC threads, bolts of each length	15
	3/8", assorted lengths, with nuts, NC threads, bolts of each length	15
	½" assorted lengths, with nuts, NC threads, bolts of each length	15
	¼", assorted lenths, with nuts, NF threads, bolts of each length	10
	3/8", assorted lengths, with nuts, NF threads, bolts of each length	10
	½", assorted lengths, with nuts, NF threads, bolts of each length	10
Bolts, stove	Assortment, 3/16" X ½" to ¼" X 1", with nuts	125
Brake, fluid	High temperature, gallon	1
Broom, floor	24", push type, made for sweeping concrete, with handle	6
Brush, bench	8", with handle	4
Brush, parts cleaning	Nylon bristles, adjustable sleeve to permit locking the bristles in any of 3 positions	4

ITEM	DESCRIPTION EXAMPLES	QUANTITY
Brush, paint	2", all pure bristle	4
	4", all pure bristle	4
Brush, wire	Overall length 14", brush part 6"	8
Carbonds, carbon arc	Copper coated, break resistant, 3/8" X 6"	6
	Copper coated, break resistant, 1/4" X 6"	6
Carbon paste	Large can, used to protect threads while welding and for making molds of broken gear teeth, etc.	2
Carbon plates	6" X 1/4", used as back-up plates	12
Carbon rods	Various diameters, for welding around bolt holes	25
Cement, gasket	Permatex Form-A-Gasket #2, 1 ½ oz. tube	8
Cleaner, battery	Baking soda, ½ lb. boxes	2
Cleaner, brush	Liquid form, gallons	3
Cleaner, hand	Waterless, removes grease, paint, adhesives, etc.; 6 lb. cans, Go-Jo, cases	2
Cleaner, radiator	6 oz. can	3
Cloth, aluminum oxide	220J grit, 1" X 50 yd. roll	1
Cloth, crocus	Extra fine for polishing metal, 50 sheets per package	1
Cloth, emery	Fine grit, 50 sheets/package	2
	Medium grit, 50 sheets/package	2
Compound, grease absorbant	Granular form, 50 lb. bags	2
Compound, steam cleaner	Liquid form, gallons	5
Compound, sweeping	Oil base, for use on wood and cement floors, 200 lb. container	1
Compound, valve lapping	Four oz. can of valve lapping or grinding compound, cans	4
Coolant	For sawing and milling machines, water soluble, gallons	20
Cotter pins	Steel, assortment 1/16" X 1/2" to 1/4" X 2", boxes	2
Coupler, grease gun	Hydraulic snap-on coupler ends for grease gun 1/8" p.t. female inlet	2

ITEM	DESCRIPTION EXAMPLES	QUANTITY
Cover plates, plastic	Oxy-acetylene clear cover lenses, pair	4
	Arc welding clear cover plates	4
Cutters, grinding wheel dresser	#0, high grade cabon steel	2
Degreaser	Gunk, super concentrate, 15 oz. cans	5
	Detergent (TIDE), pounds	15
Discs, sander	50 grit, box of 25	2
Electrodes, mild steel	E7014, 1/8", pounds	125
Electrodes, cast iron	1/8" nickal electrode for machineable welds, AC/DC, pounds	50
Electrodes, hardsurfacing	1/8", to resist high impact, AC/DC, pounds	50
File handles	4-9/16" long	20
Filters, air compressor	Air compresseor replacement filter pads	2
Filters, respirator	Respirator replacement filter pads for painting	15
Fitting, lubrication	Assortment, for 1/8" and ¼" P.I., box of 125	1
Flints, torch lighter	Replacement flints, box of 6	5
Fuel, diesel	Gallons	5
Fuel, gasoline	Gallons	20
Fuel, kerosine	Gallons	20
Fuses	Assortment, 15 amps to 200 amps, individual	10
Flux, brazing	Anti-Borax, 1 lb. cans	4
Flux, cast iron	1 lb. can	1
Gas, propane	14 oz cylinders, 1" threaded top, center sealing	10
	Appropriate gas (carbon dioxide, argon, helium) for TIG or MIG welder, cylinder	1
Gasket materials	Composition sheet cork, 1/16" X 28" X 50", sheets	3
Gasket sets	Small engine, assortment	10

ITEM	DESCRIPTION EXAMPLES	QUANTITY
Glue	Epoxy, 1 oz. tubes	1
	Elmers, gallons	2
Keys, flywheel	Assortment	25
Lens, filter	Oxy-acetylene replacement filter lens, No. 6, matched pair	4
	Arc welding replacement filter plates, No. 10	2,6
Lubricant, crankcase oil	SAE 10W-30, SE, cases	2
Lubricant, gear oil	SAE 90, gallons	5
	SAE 140, gallons	5
Lubricant, hydraulic oil	Hydraulic jack oil, gallons	2
Lubricant, machine oil	Three-in-one, 3 oz. cans	6
Lubricant penetrating oil	Liquid wrench, 8 oz. cans	14
	WD-40, 12 oz. cans	10
Lubricant, multi-purpose grease	Lithium base, 14 oz. tubes	24
Lubricant, wheel bearing grease	Pounds	5
Lubricant, graphite	Powder, 4 oz. can	1
	Stick, 4 oz.	1
Lubricant petroleum jelly	1 lb. jar, for battery terminals	1
Lubricant, transmission fluid	Appropriate type of transmission and/or transmission-hydraulic fluid, gallson	5
Metal, mild steel	1/4", 3/8", 1/2" X 20', rounds of each	5
	5/16", 7/16", 5/8" X 20', rounds of each	3
	1/8" X 1" X 20', flats	6
	3/16" X 1" X 20', flats	6
	1/4" X 1-1/4 X 20', flats	6
	1/8" X 1" X 20', angles	4
	3/16" X 1-1/2" X 1-1/2" X 20', angles	4
	1/4" X 2" X 2" X 20', angles	3
	2" X 1" X 1/8" X 10', channels	4
	36" X 96", 26 ga., galvanized sheets	2
	1/8" X 36" X 96", black sheets	2
	1/4" X 36" X 96", black sheets	2
Metal, tool steel	3/8", 1/2", 5/8" X 20', octagon bars of each	1

ITEM	DESCRIPTION EXAMPLES	QUANTITY
Nuts	Assortment, 1/4" thru 5/8", NC threads, hex, boxes.	2
	Assortment, 1/4" thru 5/8", NF threads, hex, box	1
Oxygen	122 cu. ft. cylinders	3
Paint, remover	Paint and varnish remover, gallons	1
Paint, thinner	Turpentine, gallons	4
Powder, hardening	For hardening plow shears, mower blades, etc. 1 lb. cans	2
Rags, whping	Near white rags, pounds	50
Remover, rust	Naval jelly, quart	1
	Aluminum jelly, quart	1
Rivets, pop	Assortment, box of approximately 200	1
Rivets, soft metal	Diameters 1/4", 3/16", 1/2"; Lengths 1/4" to 1-1/2", 5 lbs. per box, boxes	3
Sand	For sandblasting and annealing, pounds	150
Screws, cap	Assortment, 1/4" X 1/2" to 1/2" X 1-1/2", NC, box	1
Screws, lag	1" X 1/4", box of 100	1
	2" X 5/16", box of 100	1
	3" X 3.8", box of 100	1
Screws, machine	Assortment, round head, 4-40 X 1/2" to 1/4-20 X 2" approximately 200, box	1
Screws, self-tappin	Assortment, hex head, #6 X 3/8" to #10 X 1/2", approximately 200, box	1
Screws, set	Assortment of 16 sizes, box of 140	1
Shim stock	Brass; 6" X 100" rolls; one roll each .005" & .003" thick	1
Solder	50/50, acid core, 1 lb. spools	2
	50/50, resin core, 5 lb. spools	2
Solvent	Varsol, 55 gallon drum	1
Stone, soap	5" X 1/2" X 3/16", sticks	24
Stone, hone	Finishing stone for small engines, 200 grit for cast iron, set	1
	Roughing stone for small engines, 60 grit for cast iron, set	1
	Surfacing stone for large bore engine, 180 grit, set	1

ITEM	DESCRIPTION EXAMPLES	QUANTITY
	Stones set for aluminum engines	1
Stone, valve ginding	For general purpose fine-finish grinding of all valves	1
Stone, valve seat grinding	Assortment, Ruby-Tone Vibra-Centric valve seat grinding stones	2
Tape, plastic	Black vinyl, 3/4" X 66', rolls	2
Tape, friction	3/4" X 30', rolls	2
Tape, masking	1" X 60 yds., rolls 2" X 60 yds., rolls	3 2
Tape, scotch	3/4" X 2592', rolls	2
Terminals, automotive wiring	Service kit, contains 10 different types of single-grip terminals, solderless	2
Washers, flat	Assortment, 3/16" to 3/4", box of approximately 100	1
Washer, lick	Helical spring, 3/16" to 3/4", box of approximately 100	1
Water, distilled	For use in batteries, gallons	2
Welding Rods, bronze	36" X 1/8", pounds 36" X 3/32", pounds	15 20
Welding Rods, mild steel	36" X 1/8", pounds 36" X 3/32", pounds	20 20
Welding Rods, aluminum	36" X 1/8", pounds	5
Welding, wire spools	Aluminum, one pound spool, 3/64" dia. Hard wire, one pound spool, .035" dia.	2 5
Wheels, grinder	Aluminum Oxide; Carburundum, Simonds, or equivalent	4
Wheels, wire brush	Designed for heavy duty brushing, medium wire size	2
Wire, spark plug	16 AWG, 100' spool	1
Wire, automotive primary	16 AWG, 100' spool	2
Wool, steel	#0, 4-1/2" X 1" pads, 16 pads per package	5 pk.

APPENDIX G

SUPPLIES FOR TEACHING FARM MECHANICS
(Morford, 1956, Chapter 6)

SUPPLIES FOR TEACHING FARM MECHANICS

Farm mechanics like any laboratory subject requires teaching supplies. Some of the supplies are consumed in the instructional process while others may return their value through a charge levied on the projects constructed or repaired by the students.

The shop that operates smoothly is one that has a rather complete stock of supplies on hand at all times. Adequate supplies save the students' time, eliminate undesirable small purchases and contribute to the efficient organization and management of the shop.

Local merchants are often willing to give substantial discounts to the school and thus make it possible for the vocational agriculture department to re-sell to the students at a saving or at near the local retail price.

It is usually a common practice for the instructor to prepare a complete list of the supplies he will need at least to start the school year. This is submitted to the board of education through the superintendent of schools. After approval, sealed bids are then received from local suppliers and purchases made from the lowest bidders. The same policy is usually followed in the purchase of shop tools and equipment. The local hardware and lumber dealers are usually interested bidders.

The selection of teaching supplies should be based on the local teaching program. Most supplies will fall into the following classes:

1. Consumable teaching supplies. These supplies are consumed in the teaching process. Forge coal, welding gas, gasoline, solder, oil and small amounts of steel, lumber and similar materials can correctly be charged to teaching costs. A study of the required projects gives a good indication of the kind and amount of supplies that will be needed.

2. Refunding supplies. A rather complete stock of general shop supplies contributes materially to the orderly conduct of the shop program. A great deal of time is lost if it is necessary for the students to provide all of their materials. It is expected that the student will pay all costs of materials but it is usually not advisable to attempt to build up a balance in this account. Usually a moderate sum of one hundred or more dollars is set aside to use to purchase supplies. As sales are made to the students the collections are credited to this account. The sale of a "punch card" is a rather common practice. Usually the student's shop record card serves as an adequate record. The superintendent of schools generally has control over this fund. A careful record should be kept of collections and charges. An audit of the records should be made at specified periods.

The following is a suggested list of teaching supplies:

Amount	Item	Size or Description
	A. Carpentry	
150 bd. ft.	White Pine	1" x 12", #2
50 bd. ft.	Fir or Hemlock	2" x 4", #1
24 bd. ft.	Fir or Hemlock	2" x 6", #1
2 sheets	Plywood	3/8" x 4' x 8' Ext. A-C
1 sheet	Presswood	1/8" x 4" x 8" Tempered
1 bundle	Red Cedar shingles	#1 or XXXXX
1 bundle	Asphalt shingles	210 #, 3 tab
1 square	Felt	15 #
1 lb.	Asphalt cement	

Amount	Item	Size or Description
6 ft.	Drip edge	Galvanized steel
30 lb.	Box nails	7d
10 lb.	Box nails	5d
5 lb.	Box nails	2d cement coated
5 lb.	Box nails	3d galvanized
10 lb. each	Common nails	8d, 12d
15 lb.	Common nails	16d
2 lb.	Roofing nails	7/8" galvanized
10 lb.	Casing nails	8d
2 lb. each	Finish nails	4d, 6d
1 box each	Wire brads	1/2", 3/4", 1"
1 box each	Fine nails	1/2", 3/4", 1"
2 lb. each	Staples	Fence 1 1/4", poultry 7/8"
1 box	Corrugated fasteners	1/2"
3 gross	Flat head wood screws	1 1/2" #10
1 gross each	Flat head wood screws	3/4" #7, 1" #7
1 gross each	Round head woodscrews	1 1/2" #10, 1" #7
100	Lag screws	25 each 1/4" x 2", 1/4 x 3", 3/8" x 2", 3/8 x 3"
10 lb.	Glue	Casein powder
36 sheets	Sandpaper	Assorted #00, #0, #1/2, #1 1/2

B. Metal Work

500 lb.	Forging coal	
6 bars	Round mild steel	3/8" x 14' or 20'
4 bars each	Round mild steel	1/4", 1/2" x 14' or 20'
2 bars each	Round mild steel	5/16", 7/16", 5/8" x 14' or 20'
6 bars	Mild steel	1/8" x 1" x 14'
4 bars	Mild steel	1/4" x 1 1/4" x 14'
2 bars	Mild steel	3/8" x 1" x 14'
2 bars	Angle iron	1" x 1" x 1/8" x 14'
2 bars each	Octagon tool steel	1/2", 5/8" x 10' or 14'
100	Machine bolts and nuts	Assorted 1/4", 3/8", 1/2"
100	Carriage bolts and nuts	Assorted 1/4", 3/8", 1/2"
100	Stove bolts and nuts	Assorted 1/8" x 1/2", 1/4" x 1", 1/4", 2", 1/4" x 3"
10 lb.	Iron washers	Assorted 5/16", 3/8", 7/16", 1/2", 3/4"
2 lb.	Lock washers	Assorted 5/16", 7/16", 9/16"
10 lbs.	Rivets, soft iron	Assorted 1/8" x 1", 3/16" x 2", 1/4" x 2"
2 doz.	Hacksaw blades	12", 24 teeth per inch

Amount	Item	Size or Description
1 doz. each	Hacksaw blades	12", 18 and 32 teeth per inch
1 each	Sheet metal	28 ga. galvanized 24" x 96" 16 ga. black 24" x 96" 26 ga. galvanized 28" x 96" 30 ga. galvanized 30" x 96" 18 ga. aluminum 30" x 96"
5 gal.	Gasoline	White, unleaded
10 sheets	Emery cloth	Assorted grits
5 lb.	Solder	Wire
3 cans	Flux	Paste
3 blocks	Sal ammoniac	

C. Machinery Repair

5 lb. each	Grease	Light cup, pressure
1 gal. each	Motor oil	#10, #20
5 gal.	Solvent	
10 lb.	Clean rags	
3 boxes	Cotter keys	
1 box each	Rivets	Ledger plate, knife section
1 pt.	Gasket shellac or Permatex	
5	Wire brushes	

D. Glazing and Painting

5 lb.	Glazing compound	
1 box	Glaziers points	
1 gal.	Linseed oil	Boiled
1 each	Sash frames	4 panes 10" x 12" 4 panes 8" x 10"
6	Glass panes	10" x 12", single strength
20 lb.	White lead	
1 gal.	Grey paint	Enamel
2 gal.	Turpentine or oleum spirits	
1/2 gal.	Floor sealer	
1 gal.	Paint remover	Paint and varnish
2 each	Paint brushes	1", 2", 3"
1	Stencil brush	
1 tube each	Color pigments	Burnt umber, India red, Chrome oxide green, Italian sienna
1 qt.	Lacquer	Clear

E. Arc and Oxy-acetylene Welding		
Amount	Item	Size or Description
1 tank each	Oxygen, Acetylene	Standard commercial
10 lb. each	Welding rod	Steel 1/16", 1/8" Bronze 1/16", 1/8"
5 lb.	Cast welding rod	1/4"
5 lb.	Hard surface rod	Stoodite or Stellite 1/8"
1 lb. each	Flux	Cast, bronze
50 lb. each	Electrodes, general purpose purpose	1/8" E6013 5/32" E6013
10 lb.	Electrodes, gen. pur.	3/32" E6013
5 lb.	Electrodes	Non-machinable cast
5 lb.	Electrodes	Machinable cast (nickel)
12 each	Carbon electrodes	3/8" 1/4" copper coated

F. Plumbing

1 length each	Pipe	1/2", 3/4" x 20' galv., stand.
2 each	Tees, couplings, elbows, street elbows, unions, plugs	1/2", 3/4"
2 each	Reducing couplings, reducing elbows	3/4" to 1/2"
1	Sill cock	3/4"
1 box	Faucet washers	Assorted
12 ft.	Copper tubing	1/2" rigid
4 each	Elbows, tees	1/2" copper sweat fittings
12 ft.	Copper tubing	1/4" flexible
3	Compression fittings	1/4" copper
3	Flare fittings	1/4" copper
1 gal.	Cutting oil	Lard oil
1 lb.	Red lead	

G. Electrification

50 ft.	Electrical cable	#14-2 wire "Romex"
100 ft.	Electrical cord	#18-2 wire
100 ft.	Wire, rubber covered	#14
5 rolls	Friction tape	3/4"
5 rolls	Rubber tape	3/4"
2	Switches	Toggle
2	Switches	3 way
1	Switch	4 way
2	Switch and fuse box	Double pole, single throw

Amount	Item	Size or Description
1	Junction box	
3	Receptacles	Duplex
6	Receptacle or switch box	
1	Ceiling outlet	
6 each	Fuses	15 , 20 amps
1 box	Staples	Insulated
4 each	Plugs	Male, female
50	Solderless connectors	Assorted

H. Concrete

2 sacks	Cement	Portland (Secure as needed)
1 cu. yd. each	Gravel, Sand	Washed

I. Rope Work

20 lb.	Manilla rope	3/8"
10 lb.	Manilla rope	1/2"
1 ball	cotton cord	

APPENDIX H

CONDENSED LIST OF CONSUMABLE AND REFUNDABLE SUPPLIES

Condensed List of Consumable and Refundable Supplies Used in Agricultural Mechanics Laboratories in Agricultural Production Programs

Woodworking

Rough Lumber

Item	Quantity	Description
1. Oak	500 bd. ft.	Rough cut, air dried
2. Poplar	500 bd. ft.	Rough cut, air dried
3. Pine	1000 bd. ft.	Rough cut, air dried
4. Cedar	350 bd. ft.	Rough cut, kiln dried
5. Other types of wood	500 bd. ft.	Rough cut, kiln dried
6. 2x4	425 linear ft.	Kiln dried
7. 2x6	250 linear ft.	Kiln dried
8. 2x10	125 linear ft.	Kiln dried
9. 2x12	200 linear ft.	Kiln dried

Plywood

Item	Quantity	Description
1. 1/8" plywood	160 sq. ft.	5 sheets, indoor
2. 1/4" plywood	224 sq. ft.	7 sheets, indoor
3. 1/2" plywood	192 sq. ft.	6 sheets, indoor
4. 3/4" plywood	128 sq. ft.	4 sheets, indoor
5. 1/4" plywood	192 sq. ft.	6 sheets, outdoor
6. 1/2" plywood	416 sq. ft.	13 sheets, outdoor
7. 3/4" plywood	384 sq. ft.	12 sheets, outdoor
8. Pegboard	96 sq. ft.	3 sheets, 1/4" thick
9. Hardboard	128 sq. ft.	4 sheets, 1/4" thick

Dowel Rods

Item	Quantity	Description
1. 1/8"	39'	Various lengths
2. 1/4"	36'	Various lengths
3. 3/8"	36'	Various lengths
4. 1/2"	27'	Various lengths
5. 5/8"	24'	Various lengths
6. 3/4"	27'	Various lengths
7. 1"	27'	Various lengths

Roofing Materials

Item	Quantity	Description
Asphalt shingles	14 bundles	White or black
Roof flashing	60'	White or galvanized
Roofing nails	11 lbs.	1" length

Sanding Materials

Item	Quantity	Description
Fine sanding belt	20 each	24" portable, 48" stationary
Medium sanding belt	20 each	24" portable 48" stationary
Coarse sanding belt	12 each	24" portable, 48" stationary
Fine sanding disc	20 each	Portable & stationary, 5", 7", 9", 10" or 12"
Medium sanding disc	20 each	Portable & stationary, 7", 9", 10" or 12"
Coarse sanding disc	12 each	Portable & stationary, 9", 10" or 12"
Fine sanding sleeve	8	1" diameter
Medium sanding sleeve	8	1" diameter
Coarse sanding sleeve	6	1" diameter
Fine sanding sleeve	10	2" diameter
Medium sanding sleeve	12	2" diameter
Coarse sanding sleeve	8	2" diameter
Fine sandpaper	150	sheets 8x11 or 9x12
Medium sandpaper	200	sheets 8x11 or 9x12
Coarse sandpaper	150	sheets 8x11 or 9x12

Sawblades and Cutting Tools

Item	Quantity	Description
1/4"w. band saw blades	7	length to fit machine
3/8"w. band saw blades	7	length to fit machine
1/2"w. band saw blades	9	length to fit machine
Other w. band saw blades	9	1/8", 5/8", 3/4" or 1" length to fit machine
Jig saw blades	36	order nearest qty/bx
Coping sawblades	36	order nearest qty/bx
Sabre saw blades	14	order nearest qty/bx
Portable circular sawblades	3	7" diameter
Stationery circular sawblades	2	10" or 12" diameter
Stationery cross cut blades	2	10" or 12" diameter
Stationery combination blades	3	10", 12" or 14" diameter

Sawblades and Cutting Tools (continued)

Item	Quantity	Description
Stationary planer blades	2	10" or 12" diameter
Carbide tip blades	2	36% of department's use this type of tips set
Cutting bits for router	12	Various shapes in set
Edging bits for router	11	Various shapes in set
Countersinks size 8 and smaller	9	Various lengths in set
Countersinks size 9 and larger	7	Various lengths in set
Speed bores in set	9	Various sizes
Points in hand drill set	9	Various sizes
Speed bores of which more than 1 is ordered	2 each	1/4", 5/16", 3/8", 7/10", 1/2"

Drill bits (see Metal working, sawblades and cutting tools)

Nails and Fasteners

Item	Quantity	Description
Com. nails size 8 and smaller	30 lbs.	Various sizes
Com. nails size 9 and larger	30 lbs.	Various sizes
Finishing nails size 8 and smaller	20 lbs.	Various sizes
Finishing nails size 9 and larger	10 lbs.	Various sizes
Wire nails	9 boxes	Assorted sizes, 1/2 lb or 1 1/2 lb boxes
Wire brads	4 boxes	Assorted sizes, 2 oz, 6 oz, 1 1/2 lb. or 2 1/2 lb. boxes
Corregated fasteners	4 boxes	Assorted sizes
Heavy duty tacker staples	2 boxes	1/4", 1000 per box
Heavy duty tacker staples	2 boxes	5/16", 1000 per box
Heavy duty tacker staples	4 boxes	3/8", 1000 per box
Heavy duty tacker staples	8 boxes	1/2", 1000 per box
Heavy duty tacker staples	1 box	1", 1000 per box
Flat head wood screws size 8 and smaller	550 each	Various sizes
Flat head wood screws size 9 and larger	550 each	Various sizes
Round head wood screws size 8 and smaller	450 each	Various sizes
Round head wood screws size 9 and larger	450 each	Various sizes

Nails and Fasteners (continued)

Item	Quantity	Description
Square bent screw hooks	60	Various sizes
Screw eyes	100	Various sizes
Screw hooks	65	Various sizes
Roofing nails (see roofing materials)		

Miscellaneous Woodworking Items

Item	Quantity	Description
Tape measures or replacement blades	4	Inch or metric
Chalk blocks for marking strings	2	Various shapes and sizes

Metal Working

Forge

Item	Quantity	Description
Gas	Depends on amount of work done	
Coal	120 lbs.	Depends on amount of work done

Metals

Item	Quantity	Description
Galvenized sheet metal	3 sheets/24 sq. ft.	Assorted guages: 18, 20, 22, 24 or 26
Galvenized sheet metal	15 sheets/20 sq. ft.	Assorted guages: 18, 20, 22 or 28
Galvenized sheet metal	2 sheets/16 sq. ft.	Guage: 28
Black sheet metal	24 sheets/18 sq. ft.	Guage: 10
Aluminum sheets	Depends on projects selected	
Round steel	20'	3/8"
Round steel	20'	1/2"
Round steel	10'	7/16"
Round steel	15'	3/4"
Mild steel bars	50'	Various lengths: 1/2"w. x 1/2"thick 2"w. x 1/4"t. 2"w. x 1/8"t. 1/2"w. x 3/8"t. 1"w. x 1/2"t. 1 1/2"w x 3/8"t.

Metals (continued)

Item	Quantity	Description
Angle iron	40'	Various lengths, sizes: 1"w. x 1"w.x 1/8"t. 1"w. x 1"w. x 1/4"t. 1 1/2"w x 1 1/2"w. x 1/4"t. 2"w. x 2"w. x 1/4"t. 1/2"w. x 1/2"w. x 1/8"t. 1 1/2"w. x 1 1/2"w. x 1/8"t. 3/4"w. x 3/4"w. x 1/8"t.
Octagon tool steel	10'	1/2" diameter
Octagon tool steel	10'	5/8" diameter
Octagon tool steel	20	Assorted sizes
Threaded rod	Depends on projects selected	Order by diameter size and number of threads per inch

Grinding and Buffing

Item	Quantity	Description
Fine grinding wheel	3	
Coarse grinding wheel	3	
Medium wire wheel	2	
Coarse wire wheel	3	
Cloth buffing wheel	2	Soft material sewn on hard fiber bonded
Rouge (for cloth wheels) (not in data)	1 box	Assorted types
Abrasive metal sanding disc	12	Various grits
Sheets of crocus paper	110	80, 100, 120 grits
Sheets of emery cloth	20	Various sizes
Crocus paper rolls	2	Various lengths
Emery cloth rolls	1	50 yds.

Saw Blades and Cutting Tools

Item	Quantity	Description
Hack saw blades	26	Various sizes
Power hack saw blades	12	Various widths/lengths
Drill bit sets	2	Various sizes
Drill bit sizes where more than 2 are ordered:	4	1/16
	4	5/64
	4	3/32
	4	7/16
	4	1/8

Saw Blades and Cutting Tools (continued)

Item	Quantity	Description
Drill bit sizes	4	9/64
	3	5/32
	3	11/64
	4	3/16
	3	19/64
	3	7/32
	3	15/64
	4	1/4
	3	17/64
	4	9/32
	3	5/16
	3	21/64
	3	11/32
	3	23/64
	4	3/8
	3	13/32
	3	1/2
Cutting oil	1 pt.	Depends on amount of cutting done

Bolts and Fasteners

Item	Quantity	Description
Aluminum rivets	60	Assorted: 2 sizes
Soft iron rivets	185	Assorted: 3 sizes
Tubular rivets	Depends on projects selected	
Pop rivets	160	Assorted: 3 sizes
Self tapping screws	85	Assorted: 5 sizes
Flat head stove bolts	140	Assorted: 6 sizes
Round head stove bolts	150	Assorted: 5 sizes
Carriage bolts	375	Assorted: 19 sizes
Cap screws	115	Assorted: 8 sizes
Machine bolts	350	Assorted: 14 sizes
Cotter pins	225	Assorted: 8 sizes
Wing nuts	85	Assorted: 4 sizes
Lock washers	270	Assorted: 8 sizes
Flat washers	400	Assorted: 6 sizes
Nuts	525	Assorted: 6 sizes

Soldering

Item	Quantity	Description
Solder, resin core	7 lbs.	Spools
Solder, acid core	5 lbs.	Spools
Solder	1 lb.	Bars
Flux	2 lbs.	
Propane	5 bottles	Small torch size btls.

Other Agricultural Mechanics Areas

Electricity

Item	Quantity	Description
Light bulbs	10	60 or 100 watts
Insulation tape	5 rolls/50 yds.	
Friction tape	5 rolls/50 yds.	
Fuses	15	15 or 30 amps
Solderless wire connectors	75	
Insulated staples	17 boxes	250/box
Electrical cable	175'	Size 12 or 14
Electrical cable	235'	Size 12 or 14
Electrical wire	135'	Size 10, 14 or 18
Electrical wire	60'	Size 2, 12 or 14

Plumbing

Item	Quantity	Description
Plastic pipes	3/40'	1/2", 3/4" or 1 1/2"
Plastic pipes	3/55'	1/2"
Metal pipes	2/45'	1/2", 1" or 1 1/2"
Metal pipes	3/20'	1/2" or 1"
Rigid copper tubing	36'	1/2" or 1 1/2"
Flexible copper tubing	15'	1/2"
Faucet washers	10	1/2" or 1"
Metal tees	10	1/2", 3/4" or 1 1/2"
Metal couplings	10	1/2", 3/4" or 1 1/2"
Metal elbows	10	1/2", 3/4" or 1 1/2"
Metal street elbows	8	1/2", 3/4" or 1 1/2"
Metal unions	10	1/2", 3/4" or 1 1/2"
Metal plugs	12	1/2", 3/4" or 1 1/2"
Metal reducing couplings	10	1/2", 3/4" or 1 1/2"
Metal reducing elbows	10	1/2", 3/4" or 1 1/2"
Metal sill cock	6	1/2" or 1 1/2"
Plastic tees	12	1/2", 3/4" or 1 1/2"
Plastic couplings	18	1/2" or 3/4"
Plastic elbows	10	1/2", 3/4" or 1 1/2"
Plastic street elbows	20	1/2" or 3/4"
Plastic unions	5	3/4"
Plastic plugs	6	1/2" or 3/4"

Welding

Item	Quantity	Description
Oxygen	700 cu. ft.	Various sizes/No. of tanks
Acetelene	550 cu. ft.	Various sizes/No. of tanks

Welding (continued)

Item	Quantity	Description
Other gases	275 cu. ft.	
Clear goggles lenses	20	
Color goggle lenses	10	Electric welder's helmet 4, 5, 6, 10 (67% are 10)
Electrode machineable cast	20 lbs.	
Electrode mild steel	220 lbs.	
Aluminum electrodes	13 lbs.	
Nonmachineable cast electrodes	13 lbs.	
Hard surfacing electrodes	12 lbs.	
Steel welding rods	12 lbs.	
Cast iron welding rods	15 lbs.	
Aluminum welding rods	13 lbs.	
Bronze welding rods	15 lbs.	
Hard surfacing rods	15 lbs.	
Cast iron flux	11 lbs.	
Aluminum flux	1 lb.	
Braising flux	5 lbs.	
Carbon rods	7 lbs.	
Flint starters	15	
Color goggle lenses	8	Gas welder set 4, 5, 10 (78% are 5)
Asbestos gloves	5 pr.	

Painting, Finishing, Glazing

Item	Quantity	Description
Brushes	12	Various sizes
Brushes	7	1/2", 1", 1 1/2", 2"
Brushes	8	3", 4" (1"/2" most pref.)
Stencil brush	3	
Parts cleaning brush	3	1" or 2"
Paint rollers	6	7" or 9"
Indoor paint	5 gal.	
Exterior paint	3 gal.	
Metal paint	5 gal.	
Varnish stain	3 gal.	
Oil stain	2 gal.	
Linseed oil	2 gal.	
Shellac	2 gal.	
Lacquer	2 gal.	
Natural wood preservative sealer	3 gal.	
Mineral spirits	8 gal.	
Paint remover	3 gal.	
Turpentine	5 gal.	

Painting, Finishing, Glazing (continued)

Item	Quantity	Description
Lacquer thinner	5 gal.	
Fine steel wool	19 pads	
Medium steel wool	21 pads	
Coarse steel wool	16 pads	
Plastic wood oak	1 1/2 lbs.	
Plastic wood walnut	2 lbs.	
Plastic wood natural	3 lbs.	
Plastic wood dark mahogany	2 lbs.	
Other colors plastic wood	4 1/2 lbs.	Colors to meet needs
Plastic wood solvent	2 pts.	
Liquid glue	2 gal.	
Contact cement	19 oz.	
Epoxy	8 oz.	
Resin glue	3 lbs.	
Paste wax	2 lbs.	
Replacement filters for respirator	17	
Glazier points	80	
Glazing compound	3 lbs.	

Masonry

Item	Quantity	Description
Corner blocks	25	
Strecher blocks	60	
Other types of blocks	20	
Bricks	70	
Gravel	945 lbs.	
Mortar sand	1050 lbs.	
Cement	500 lbs.	
Sand for concrete	1050 lbs.	
Lime	230 lbs.	
Masonry dill bits in set	3	Various sizes: 1/4, 3/8, 1/2, 5/8, 3/4, 1

Ropework

1/2" manila rope	60'
3/8" mainla rope	100'
Whipping cord	Based on quality of rope and amount of time used

Machinery and Engine Repair

Item	Quantity	Description
Cup grease	3 lbs.	Long fiber
Cup grease	5 lbs.	Nonfiber
Cup grease	6 lbs.	Short fiber
Oil	28 qts.	10W-40
Gasoline	26 gal.	
Hydraulic fluid	17 gal.	
Penetrating oil	26 oz.	
WD40	48 oz.	
Antifreeze	30 gal.	
Radiator-flush cleaner	5 oz.	
Spark plugs	12	
Baking soda	1 box	
Distilled water	2 gal.	
Assorted gaskets	60	
Finishing stone	5	
Roughing stone	2	
Surfacing stone	8	
Sweeping compound	40 lbs.	Grease absorbant

Shop Cleaning and Miscellaneous

Item	Quantity	Description
Steam cleaner detergent	18 lbs.	
Steam cleaner detergent	5 gal.	
Detergent soap	26 lbs.	
Liquid soap	5 gal.	
Parts cleaning fluid	30 gal.	
Scouring powder	52 oz.	
Vacuum cleaner bags	16	
Large trash bags	25	
Pumice stone	4 lbs.	
Goup hand cleaner	74 oz.	
Push brooms	4	
Counter brushes	7	
Cleaning rags	45 lbs.	
Waste material for cleaning	15 lbs.	
Shop aprons	20	
Safety goggles	28	
Standard staples	4 boxes	2000/box
Masking tape	9 rolls/50 yds.	Various widths
Masking tape	9 rolls/65 yds.	1/2", 3/4", 1 1/2", 2", 3"
Scotch tape	3 rolls/100 yds.	Various widths
Scotch tape	8 rolls/50 yds.	1/2", 1 1/2", 1", 2"

APPENDIX I

CHECKLIST TO AID IN IDENTIFYING A CONSUMABLE SUPPLY LIST

Agricultural Mechanics Consumable and Refundable Supplies Checklist
for Identifying a Consumable Supply List

Program Variables

1. How many students are in the program?
2. How much storage space is available for the supplies?
3. How much money is budgeted?
4. What are the objectives of the program?
5. What are the needs of the community?

Setting Priorities

1. What ag mechanics units are in the course of study?
2. What is the condition and age of the supplies I have now?
3. How much money is required to go toward pre-designated types of supplies?
4. What are the number and types of tools on hand requiring consumable supplies?
5. What supplies are on hand now?
6. What new tools and equipment are ordered and what supplies will be needed for their operation?
7. What maintenance and sharpening must be done to the tools and equipment that will take away from the money budgeted for consumables?

Donors and Discounts

1. What sponsors are available in the community to provide free supplies?
2. What stores and dealers provide a discount for supplies purchased by schools?
3. Are there state or federal funds available for consumable supply purchases?

4. Do any local, state or national companies, dealers, organizations, etc. provide any special funds or matching funds for schools buying mechanical supplies?

5. Are leases or other cooperative lending arrangements available for tools and equipment which require consumable supplies? Are supplies free? (i.e., use of tractor in exchange for advertising, getting students familiar with brand name equipment so they could make purchases in the future. Gas, oil, etc. is provided by dealer.)

General Considerations

1. Are prices compared between suppliers?

2. What is the quality of the product?

3. What is the reputation and is there a firm establishment of the manufacturers and suppliers?

4. Is there assurance of timely delivery?

5. Are there adequate sizes and quantities available for your needs?

6. Will product be delivered or picked up? Will that affect price?

7. Will the supplier replace damaged or broken items upon delivery?

8. Do the supplies meet or exceed safety requirements?

9. Is sure and adequate storage available?

10. Do students know how to properly use items to eliminate breakage and waste?

11. What required projects will be constructed?

12. What supplies will be available for students to use on approved projects which they supply some materials and purchase others?

13. What and how much reserve of popular items is needed?

14. What is needed for maintenance and repair of equipment, hand tools, and power tools?

15. What are actual and anticipated needs?